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THE INFLUENCE OF AUTONOMY, GROUP COHESIVENESS, AND THE OCCUPATIONAL COMMUNITY UPON ABILITY TO COPE WITH DANGER: A COMPARATIVE STUDY OF TWO OCCUPATIONAL GROUPS

by

© Douglas George Kazulak

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE
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DEPARTMENT OF SOCIOLOGY

EDMONTON, ALBERTA
SPRING, 1979

UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

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....

Date 19 April '79

For Peggy

Whose patience, love, and understanding
helped show me the way.

ABSTRACT

The specific problem that was addressed in this thesis concerned how underground miners coped with the fact that they worked in a dangerous environment. Drawing upon the industrial and organizational literature as well as the literature in social psychology and military sociology dealing with dangerous or threatening situations, relevant factors were discovered and a research model developed.

In order to control extraneous factors and assure variability in the measures of danger employed, data was gathered from both underground miners and mill operators in the same relatively isolated sector of Northern Ontario.

The most consistent result in this study concerned the overall importance of group cohesiveness for coping with danger. Other relevant factors included autonomy, off-the-job contact, supervisory styles, experience, and perception. The importance of these factors was, however, often dependent on the nature and type of danger as well as the particular occupational group involved.

It was suggested that future research endeavours might well profit by clarifying the concepts of danger and experience as well as conducting a longitudinal rather than cross sectional study.

Other suggestions included a need for multiple units of analysis and a broadening of scope to consider the dangers or threats in a variety of occupations - not just those found in the mining environment.

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When I look back at the numerous people who have helped me in this project, I realize that a thesis is truly a cooperative endeavour. Without the support of a great number of people this study might never have been completed. To all who, directly or indirectly, assisted me in the completion of this task, I extend my thanks.

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TABLE OF CONTENTS

CHAPTER PAGE

I. INTRODUCTION AND REVIEW OF THE LITERATURE.. 1
  Introduction.......................... 1
    Mining:Working Conditions.............. 4
    Coping................................. 8
  Literature Review........................ 10
    Previous Research on Mining............ 10
    Dangerous or Threatening Situations.... 21
    Perception............................. 26
    Autonomy............................... 29
    Group Cohesiveness..................... 36
  Summary.................................. 41
II. RESEARCH PROBLEM AND HYPOTHESES........... 48
  Introduction............................. 48
  The Research Model....................... 49
    Assumptions............................ 49
    Relationships.......................... 53
    Hypotheses............................. 55
  The Model Components..................... 56
    Danger................................. 57
    Autonomy............................... 60
    Group Cohesiveness..................... 65

CHAPTER PAGE

Off-The-Job Contact.................. 67
Job Satisfaction..................... 68
Effectiveness........................ 71
Theoretical and Practical Problems...... 72
Scope.............................. 73
Coping.............................. 74
Summary................................. 75
III. THE SAMPLE AND METHODOLOGY............... 79
Introduction............................ 79
Organization and Community Characteristics.......................... 79
Setting............................. 79
Work Characteristics of Miners and Mill Operators............ 81
The Sample.............................. 82
Preliminary Contacts................. 82
Selection of the Sample............. 83
Questionnaire Administration......... 85
Response Rates and Follow Up......... 86
Sample Characteristics.................. 89
Demographic and Occupational Characteristics...................... 90
Danger.............................. 93
Autonomy............................ 112
Group Cohesiveness.................. 115
Off-The-Job Contact................. 117
Job Satisfaction.................... 122

CHAPTER PAGE

Effectiveness.................... 124

Summary.......................... 126

IV. THE STRUCTURE OF RELATIONSHIPS........ 131

Introduction..................... 131

The Effect of Risk and Danger Upon Job Satisfaction and Effectiveness.................. 133

The Effect of Cohesiveness and Autonomy Upon Job Satisfaction and Effectiveness............ 139

The Effect of Danger and Occupational Group Upon Job Satisfaction and Effectiveness.... 143

Group Cohesiveness................... 148

The Effect of Cohesiveness Upon Job Satisfaction and Effectiveness Under Conditions of Danger........ 148

Autonomy............................ 155

Non-Work-Task Autonomy............... 156

The Effect of Non-Work-Task Autonomy Upon Job Satisfaction and Effectiveness Under Conditions of Danger...................... 156

Work-Task Autonomy................... 163

The Effect of Work-Task Autonomy Upon Job Satisfaction and Effectiveness Under Conditions of Danger...................... 163

Total Autonomy....................... 169

The Effect of Total Autonomy Upon Job Satisfaction and Effectiveness Under Conditions of Danger....... 169

Autonomy and Group Cohesiveness...... 173

The Effect of Group Cohesiveness

CHAPTER PAGE

and Non-Work-Task Autonomy Upon Job Satisfaction and Effectiveness....... 174

The Effect of Group Cohesiveness and Work-Task Autonomy Upon Job Satisfaction and Effectiveness....... 186

The Effect of Group Cohesiveness and Total Autonomy Upon Job Satisfaction and Effectiveness....... 197

Summary................................ 208

V. A SUMMARY OF ASSOCIATIONS................ 214

Introduction........................... 214

Autonomy and Job Satisfaction........... 216

The General Relationship Between Autonomy and Job Satisfaction........ 216

The Relationship Between Autonomy and Job Satisfaction Under Different Conditions of Danger................. 218

Synopsis............................. 219

Autonomy and Effectiveness.............. 220

The General Relationship Between Autonomy and Effectiveness........... 220

The Relationship Between Autonomy and Effectiveness Under Different Conditions of Danger................. 222

Synopsis............................. 223

Group Cohesiveness and Job Satisfaction/Effectiveness......................... 224

The General Relationship Between Group Cohesiveness and Job Satisfaction/Effectiveness................... 224

The Relationship Between Group Cohesiveness and Job Satisfaction/Effectiveness Under Different Conditions of Danger................. 226

CHAPTER PAGE
Synopsis.............................. 227
Autonomy and Group Cohesiveness.......... 228
The General Relationship Between Autonomy and Group Cohesiveness....... 228
The Relationship Between Autonomy and Group Cohesiveness Under Different Conditions of Danger.................. 231
Synopsis............................ 232
Off-The-Job Contact and Group Cohesiveness 234
The General Relationship Between Off-The-Job Contact and Group Cohesiveness............................ 234
The Relationship Between Off-The-Job Contact and Group Cohesiveness Under Different Conditions of Danger........ 235
Synopsis............................ 237
Summary.............................. 239
VI. THE IMPORTANCE OF SELECTED PREDICTOR VARIABLES............................ 243
Introduction.......................... 243
Autonomy and Group Cohesiveness.......... 245
Autonomy, Supervision and Group Cohesiveness.......................... 253
Status, Years-On-The-Job, Age, and Education............................ 261
Personal and Contextual Factors.......... 267
Coping With Danger...................... 273
Summary.............................. 286
VII. SUMMARIES AND CONCLUSIONS................ 290
Introduction.......................... 290
Theoretical and Practical Implications... 292

CHAPTER PAGE

Perception.......................... 292

Autonomy............................ 295

Group Cohesiveness.................. 297

Off-The-Job Contact................. 298

Supervisory Styles.................. 299

Experience.......................... 300

Directions for Future Research........... 301

Scope............................... 302

Units of Analysis................... 305

Measurement of Concepts............. 306

BIBLIOGRAPHY.................................. 308

APPENDICES.................................... 315

Appendix

Questionnaire and Supervisor's Rating Scale.......................... 315

Appendices 2 through 7

Work Characteristics of Miners and Mill Operators.................... 334

Appendix 8

Copies of Selected Correspondence...... 347

LIST OF TABLES

Table	Description	Page
1-1	Comparative Fatality Frequencies for Sectors of Ontario Industry	6
1-2	Non-fatal Compensable Injuries: Average Frequency for All Mining Companies in Ontario 1970 - 1974	7
3-1	Summary of Sampling Information	87
3-2	Selected Detailed Characteristics of Respondents	91
3-3	A Comparison of Sample Job Classifications with Population Job Classifications	92
3-4	Crosstabulation of Two Indicators of Type I Danger	94
3-5	Crosstabulation of Supervisor's Rating of Danger with Respondent's Perception of his Job as Dangerous	96
3-6	Crosstabulation of Supervisor's Rating of Danger with Respondent's Perception of his Chances of Accident	97
3-7	Crosstabulation of Supervisor's Rating of Danger with Respondent's Concern about Silicosis and Lung Cancer	99
3-8	Crosstabulation of Respondent's Consideration of his Job as Dangerous with his Concern about Silicosis and Lung Cancer	100

Table	Description	Page
3-9	Respondent's Response Patterns to Questions of Danger by Occupational Group	101
3-10	Response Patterns to Questions of Danger Controlling for Occupational Group and Age	107
3-11	Response Patterns to Questions of Danger Controlling for Occupational Group and Job Experience	109
3-12	Response Patterns to Questions of Danger Controlling for Risk Factors and Experience amongst Underground Miners	110
3-13	Intercorrelations for Work-Task Autonomy Items	114
3-14	Intercorrelations for Non-Work-Task Autonomy Items	114
3-15	Correlation Matrix for Total Autonomy Items	115
3-16	Intercorrelations for Cohesiveness Items	116
3-17	Intercorrelations for Participation Items	120
3-18	Intercorrelations for Helping Behavior	122
3-19	Correlation Matrix for Job Satisfaction Scales	124
3-20	Correlation Matrix for Effectiveness Index	125
4-1	The Effect of Risk and Three Measures of Danger Upon Job Satisfaction and Effectiveness	134
4-2	The Effect of Cohesiveness and Three Measures of Autonomy Upon Job Satisfaction and Effectiveness	140

Table	Description	Page
4-3	The Effect of Danger and Occupational Group Upon Job Satisfaction and Effectiveness	144
4-4	The Effect of Cohesiveness upon Job Satisfaction and Effectiveness Under Conditions of Danger as Perceived by Respondents	149
4-5	The Effect of Cohesiveness Upon Job Satisfaction and Effectiveness Under Conditions of Danger as Perceived by Respondents' Supervisors	150
4-6	The Effect of Non-Work-Task Autonomy Upon Job Satisfaction and Effectiveness Under Conditions of Danger as Perceived by Respondents	157
4-7	The Effect of Non-Work-Task Autonomy Upon Job Satisfaction and Effectiveness Under Conditions of Danger as Perceived by Respondents' Supervisors	158
4-8	The Effect of Work-Task Autonomy Upon Job Satisfaction and Effectiveness Under Conditions of Danger as Perceived by Respondents	164
4-9	The Effect of Work-Task Autonomy Upon Job Satisfaction and Effectiveness Under Conditions of Danger as Perceived by Respondents' Supervisors	165
4-10	The Effect of Total Autonomy Upon Job Satisfaction and Effectiveness Under Conditions of Danger as Perceived by Respondents	170
4-11	The Effect of Total Autonomy Upon Job Satisfaction and Effectiveness Under Conditions of Danger as Perceived by Respondents' Supervisors	171
4-12	The Effect of Cohesiveness and Non-Work-Task Autonomy Upon Job Satisfaction and Effectiveness Under Conditions of Danger as Perceived by Respondents	175

Table	Description	Page
4-13	The Effect of Cohesiveness and Non-Work-Task Autonomy Upon Job Satisfaction and Effectiveness Under Conditions of Danger as Perceived by Respondents' Supervisors	176
4-14	The Effect of Cohesiveness and Work-Task Autonomy Upon Job Satisfaction and Effectiveness Under Conditions of Danger as Perceived by Respondents	187
4-15	The Effect of Cohesiveness and Work-Task Autonomy Upon Job Satisfaction and Effectiveness Under Conditions of Danger as Perceived by Respondents' Supervisors	188
4-16	The Effect of Cohesiveness and Total Autonomy Upon Job Satisfaction and Effectiveness Under Conditions of Danger as Perceived by Respondents	198
4-17	The Effect of Cohesiveness and Total Autonomy Upon Job Satisfaction and Effectiveness Under Conditions of Danger as Perceived by Respondents' Supervisors	199
5-1	Summary of Crosstabulations Performed to Evaluate an Expected Positive Relationship Between Autonomy and Job Satisfaction	217
5-2	Summary of Crosstabulations Performed to Evaluate an Expected Positive Relationship Between Autonomy and Effectiveness	221
5-3	Summary of Crosstabulations Performed to Evaluate an Expected Positive Relationship Between Group Cohesiveness and Job Satisfaction/Effectiveness	225
5-4	Summary of Crosstabulations Performed to Evaluate an Expected Positive Relationship Between Autonomy and Group Cohesiveness	229
5-5	Summary of Crosstabulations Performed to Evaluate an Expected Positive Relationship Between Off-The-Job Contact	

Table	Description	Page
	and Group Cohesiveness	236
6-1	Regression of Group Cohesiveness and Total Autonomy Upon Job Satisfaction/Effectiveness	246
6-2	Regression of Group Cohesiveness, Non-Work-Task, and Work-Task Autonomy Upon Job Satisfaction/Effectiveness	247
6-3	Regression of Group Cohesiveness, Total Autonomy, Supportive Supervision, and Structure-Initiating Supervision Upon Job Satisfaction/Effectiveness	256
6-4	Regression of Status, Years-On-The-Job, Age, and Education Upon Job Satisfaction/Effectiveness	264
6-4a	Variance Explained in Job Satisfaction	268
6-4b	Variance Explained in Effectiveness	268
6-5	Stepwise Regression on Job Satisfaction (Total Sample)	270
6-6	Stepwise Regression on Effectiveness (Total Sample)	271
6-7	Stepwise Regression on Job Satisfaction (High Danger)	274
6-8	Stepwise Regression on Job Satisfaction (Low Danger)	275
6-9	Stepwise Regression on Effectiveness (High Danger)	279
6-10	Stepwise Regression on Effectiveness (Low Danger)	280

LIST OF FIGURES

Figure	Description	Page
2-1	The Research Model	50
2-2	Summary of Suggested Considerations in Worker Effectiveness Ratings	72

Chapter 1

Introduction and Review of the Literature

Introduction

There has been an increasing awareness on the part of many organizational and industrial researchers (Whyte,1961; Pearlin,1962; Mott et.al.,1965; Bohr and Swerloff,1969; Meissner,1971; Herman and Hulin,1972; Schneider and Snyder,1975; Stone and Porter,1975 and White,1975) that greater attention should be paid to the specifics within a given working environment, if knowledge about attitudes and behavior is desired. Blauner (1964), for example, discovered that workers employed in operations with different technologies exhibited different degrees of alienation. Those employed in printing or craft technologies, where the workers' control over the work process is greatest, exhibited lower levels of alienation than did those employed in clerical or continuous process technologies.

Technology is indeed an important component of the working environment, but what may also be of importance in the investigation of workers' attitudes and behaviors, is the existence or non-existence of hazardous working conditions. The presence of hazardous working conditions constitutes a situation which may be regarded as objectively dangerous. It would appear that those working in an objectively dangerous situation face not only the duties and responsibilities demanded by the job itself, but must also cope with the fact that they work in a dangerous environment.

Although many working environments may vary only somewhat in the degree of danger present, underground mining may be considered to be one of the most dangerous occupations in Canada today (cf.,Ham,1976). Perhaps no better evidence of this fact can be found than in the realization that in the years from 1970 to 1974, the fatality rates for underground miners in Ontario were 13.5 times greater than for those employed in manufacturing and 3 times greater than for those employed in construction (Ham,1976:131). The state of affairs in the mining industry prompted James M. Ham, the Commissioner in charge of investigating the health and safety of workers in mines, to state after nearly two years of study:

> "Frederic Le Play, a distinguished French sociologist and inspector general of the mines of France in the late nineteenth century, said that the most important thing to come out of mines is the miner. I share his conviction today."
>
> (Ham, 1971:XI)

The miner may indeed be "the most important thing to come out of the mines", but what may also be of concern is why he keeps going back into the mines. How does he cope with the fact that he works in a dangerous environment? This thesis will be geared toward answering the preceding question. In this chapter, some additional facts justifying the claim that underground mining is indeed dangerous will be presented. Following from that, industrial and organizational literature that may be of relevance in understanding how miners cope with danger will be examined.

Building upon the foundation established through a review of the literature in this chapter, a model guiding research and the concepts employed will be presented in the next chapter. The third chapter will outline the way in which research was undertaken and the measures employed, as well as offering some possible insight into the different types of danger faced by miners and their responses to that danger. Subsequent chapters, by examining the results of research, will critically evaluate the importance of selected variables, singularly or in combination, for coping with danger.

Mining

Working Conditions

The hazards a miner faces are not only confined to the possibilities of bodily injury or death due to sudden accidents, but also involve the possibilities of environmentally induced diseases such as silicosis and lung cancer, (Ham,1976:18-110 and Verma,1975:1) along with vision impairment (miner's nystagmus) due to inadequate lighting; partial deafness due to excessive noise; various forms of paralysis (Raynaud's phenomena) due to excessive vibration and a host of lesser ailments ranging from dermatitis and boils to athlete's foot and jaundice. (Verma,1975:1-5)

The results from a ten year study on occupational health and safety as reported in The Globe and Mail (1978:33) reveal that of the fatalities attributed to occupational diseases in 1975-76, one-third occurred in manufacturing, "while over half of the deaths occurred in the mining industry". When it is considered that those employed in the mining industry only constitute approximately 1.5 percent of the Canadian labour force whereas those employed in manufacturing constitute approximately 18.8 percent of the Canadian labour force, (cf.,Year Book of Labour Statistics - 1976), the actual impact of occupational diseases upon those employed in the mining industry is even more pronounced than the previous figures would indicate.

Occupational diseases are, as has been previously mentioned, only part of the hazards a miner faces. Each and every day a miner faces the very real possibility of injury or death from falling rock, loose footing, speeding machinery, untriggered explosives and a host of other hazards ranging from loose or broken cables to faulty tools and machinery. Perhaps the most telling evidence of this fact is contained in Ham's comparison of the various sectors of Ontario industry in terms of fatalities per million man hours as shown in Table 1-1.

Here, only those employed in logging have a greater fatality rate than do underground miners. Interpreting aspects of the preceding table, it can be maintained that for every billion man hours worked, those employed in underground mining operations would experience 446 fatalities in comparison to 33 fatalities in the manufacturing sector and 148 fatalities in construction. Not even the milling aspect of logging with 346 fatalities per billion man hours worked, exceeds the fatality rate for underground miners.

Within the mining industry itself, underground operations have the highest fatality rate. Speaking in terms of proportions as a basis for comparison, for

Table 1-1

Comparative fatality frequencies
for sectors of Ontario industry

Sector	Fatalities per million man hours
Manufacturing	0.033
Mining - reduction plant operations	0.045
Mining - shops and surface operations	0.066
Construction	0.148
Mining - open pit operations	0.160
Mining - all operations	0.217
Logging, sawmilling and veneer milling	0.346
Mining - underground operations	0.446
Logging	0.561

Source: Ham,1976:131

every 100 fatalities found amongst those employed in reduction plant operations (mill operators), 991 fatalities could be expected amongst those employed in underground operations (mines). For every 100 fatalities found amongst those working in the shops and on surface, 675 fatalities could be expected amongst miners. For every 100 fatalities found amongst those employed in open pit operations, 275 fatalities could be expected amongst miners. When the entire mining industry is considered, underground miners still have over twice the fatality rate found in the industry as a whole. Of course the comparison is suspect, for the fatality rates for underground miners are entered into the calculation of the fatality rate for the industry as a whole and, no doubt, tend to obscure the enormity of the difference in fatality rates between miners and other sectors of the mining industry.

A comparison of fatality rates in different sectors of Ontario industry and a comparison to other sectors of the mining industry represent means of justifying the claim that underground mining is indeed dangerous, but information on injury rates within the mining industry itself (as shown in Table 1-2) also serves to highlight, in a comparative sense, the dangerous nature of underground mining.

Table 1-2

Non-fatal compensable injuries: average frequency for all mining companies in Ontario 1970-1974

Segment of Operations	Frequency per million man hours
Shops and surface	16.5
Open pit	28.4
Reduction plants	41.2
Underground	66.9

Source: Ham,1976:140

Here, again using a proportional representation, for every 100 compensable injuries found amongst those working in the shops and on surface, 405 compensable injuries could be expected for miners. For every 100 compensable injuries found amongst those working in open pit operations, 236 compensable injuries could be expected for miners. For every 100 compensable injuries found amongst those working in reduction plants (mill operators), 162 compensable injuries could be expected for miners.

Given the fact that miners face the very real possibility of injury and death in their work, again the question must be asked, how do they cope with this reality?

Coping

David Mechanic (1974:33) provides a definition of what coping means, as well as insight into the problem, when he declares that:

> "...the ability of persons to maintain psychological comfort will depend not only on their intrapsychic resources but also - and perhaps more importantly - on the social supports available or absent in the environment."

It would appear that successful coping would be reflected in a psychological state not characterized by discontent, dissatisfaction or anxiety, but rather by a state of well-being. According to Mechanic, this state of well-being may not only be derived through an individual's own inner resources but may be dependent upon the "social supports" in the environment as well. Most work performed in our society is not performed in a vacuum. An individual working at any task, no matter what it is or how it is performed, must at some time come into contact with other people and take cognizance of their existence. Work is thus a social activity. Satisfaction with one's work, along with the successful performance of it, may be greatly influenced by the support and consideration given to the individual by others.

F.T.M. White (1967:33) reminds us of these facts when one is considering the problem of accidents in coal mines. Safety there, he says, "...depends upon an awareness of individual and inter-group responsibility for the working conditions left for others (who follow on the next shift); loss of close group feeling could lead to accidents."

In attempting to understand how miners cope with a dangerous environment, it appears that investigation could concentrate on individual psychological attributes, social supports in the environment, or a combination of both. The latter alternative appears to offer the best means of understanding and assessing how miners cope with danger, but unfortunately the resources necessary to follow such a strategy are not available to this researcher. Faced with a choice between examining psychological attributes and social supports in the environment, this researcher decided to concentrate upon the social dimensions of coping. The adoption of this position does not deny the potential importance of psychological factors in coping with danger, but seeks rather to place emphasis upon the already existing social factors in the working environment that may possibly aid miners in coping with danger.

With this emphasis in mind, the immediate task presenting itself is one of isolating the potentially relevant social factors in the mining environment. Obviously, this necessitates an examination of the literature dealing with miners and the mining environment.

Literature Review

Previous Research on Mining

Unfortunately, little has been written about miners in Canada. Such sources that do exist, have tended to stress the mining community (Lucas,1971), the company (Deverell,1975) or the resulting occupational diseases rather than the miners in their working environment. Much of the existing literature on the working environment within the mines is either from the United States or Great Britain and deals primarily with coal miners. The cultural differences between these countries and Canada may not represent important barriers in the interpretation of these studies, but the technology and work organization adopted in coal mining in these countries may differ from the technology and work organization found in nickel, copper, gold, uranium or other mineral mines which predominate in the Canadian setting.

There is, however, a common theme that appears to run throughout the literature dealing with diverse mining environments and that is the existence of high levels of group cohesiveness amongst miners (cf.,Trist and Bamforth; 1951; Friedmann and Havighurst,1954; Gouldner,1954; Dennis, Henriques and Slaughter,1956; Williams,1962; Blauner,1974; and Leyton,1975). Dennis, Henriques and Slaughter (1956:44) note that this bond is so strong that "a very common phenomenon is for men to stick together through many different contracts for years on end, sometimes for a score of years and even a working lifetime." An old miner provides an illustration of the process at work.

> "Somehow when you get into mining and you like the men you work with, you just get to the place after a while that you don't want to leave. Once that fever gets hold of a man, he'll never be good for anything else.
>
> A fellow may quit the mines, but when they whistle, he goes back. I've had a lot of better jobs, but I've always liked to work in the mines. I can't explain it, except I like being with the gang; I never could just sit around much."
>
> (Friedmann and Havighurst,1954:246)

In attempting to account for the existence of high levels of group cohesiveness amongst miners, Friedmann and Havighurst (1954:65) proclaim:

> "The sense of interdependence in relation to common dangers is undoubtably an important factor in the spirit of solidarity which has characterized miners in all countries for many generations."

This position is somewhat substantiated by Alvin W. Gouldner in The Patterns of Industrial Bureaucracy. Interestingly enough, this study, which was originally intended to illustrate the impact of a new manager upon the traditional organization of a business enterprise, is best remembered as a comparative study between underground and surface workers. Faced with explaining differences in group-cohesiveness between underground and surface workers, Gouldner (1954:131) noted that two factors were mainly responsible for the greater cohesiveness of miners. These were: "(1) the peculiar work and spatial arrangements in the mine and factory (2) the more hazardous working conditions".

Gouldner (1954:140-141) also noted that miners experienced greater job satisfaction than did surface workers. In his explanation of this finding, Gouldner pointed out that surface workers were subject to strict control over their tasks and a predominance of rules and regulations guided their conduct, whereas miners were relatively free from these restrictions. It is intriguing to note that these miners experienced greater job satisfaction than did surface workers, even in the face of more hazardous working conditions. Gouldner explained this result in terms of the greater control expected by miners over their work, yet miners also evidenced higher levels of group cohesiveness.

Additional studies (Trist and Bamforth,1951 and Trist, Higgin, Murray and Pollack,1963), dealing with mining, have also tended to stress the importance of the greater control exerted by miners over the work process as a basis for their increased job satisfaction. For example, Trist and Bamforth (1951:3-38) revealed that the change from a composite to a longwall method of coal getting resulted in increased anxiety, turnover and absenteeism. This is particularly interesting when one considers that under the composite method, work gangs were given a great deal of control over the method of coal excavation, hours of work and choice of co-workers, but under the longwall method these work gangs become subject to task specialization, strict hours of work and co-workers assigned by supervision. Examination of what is entailed in Trist and Bamforth's notion of worker control reveals that workers are not only allowed control over how and when work is to be done, but who they do this work with. It would appear that being allowed the choice of co-workers might very well foster the development of high levels of group cohesiveness so that, increased job satisfaction may be attributed to not only increased worker autonomy, but to the existence of high levels of group cohesiveness as well. When one considers the words of the old miner quoted earlier (Friedmann and Havighurst,1954:246), the importance of group cohesiveness for high levels of job satisfaction gains greater credence.

In another coal mining study, Trist, Higgin, Murray and Pollack (1963) entered a situation where the old composite system of coal mining had been replaced by the new longwall one. Under this new system, the mining process, once performed in its entirety by one crew, became divided into a three stage cycle with three different crews. The relationship between members of these different groups became tense and competitive for they depended on each other, but could not communicate. Absenteeism and turnover rates soared. By enlarging the sphere of operations of the various crews in a similar manner to what existed under the composite method, Eric Trist and his associates were able to cut absenteeism rates by almost two-thirds and increase the amount of coal removed. In this instance, it appears that increased worker control resulted not only in higher levels of satisfaction, but also in increased productivity. "The tense and competitive" relationship between different groups appears to have been alleviated by reverting to a system where one crew performed all three cycles of the mining process. It is not inconceivable that the reduction in tension and competition, through a need for co-operation, would be reflected in a greater degree of group cohesiveness. If this is so, then worker autonomy may affect not only job satisfaction and productivity, but group cohesiveness as well. Group cohesiveness, through increased co-operation, may, in turn, affect job satisfaction and productivity.

Earlier, Gouldner suggested that differences in "work and spatial arrangements" between the mine and factory were partially responsible for the greater cohesiveness of miners. When one considers the tremendous scope of many underground operations, it is easy to understand why it is difficult for a supervisor to continually oversee the activities of his men. When it is also considered that much of the work performed by underground miners is hazardous and requires concentration, a supervisor's intervention at inappropriate times may result in a break in concentration and thus constitute an additional hazard. In effect, Gouldner is pointing out why miners have greater control over their working environment. Group cohesiveness may develop in the face of hazardous working conditions, but perhaps also when a great deal of worker autonomy is present.

In any discussion of worker autonomy, it is virtually impossible not to make mention of the role played by the supervisor (the discussion of Gouldner's work is illustrative). For the supervisor may determine to some extent, how much personal freedom or discretion a worker may exercise. Commenting on supervision in the mines, White (1967:32-33) notes:

> "The role of the supervisor is extremely important as an environmental factor. Is the emphasis of his role to be centered upon higher productivity, his subordinate's welfare, or a blend of both? The role of the supervisor in mining activities is distinctly different from that in other industries. He is confronted with widely-spaced work points, difficulty of access, in unusual conditions of rock structure, of light, of noise, and the like; his is a network of supervisory activities. It is his job to maintain high morale and high productivity - two objectives that go together."

Miners may be given greater autonomy due to the limitations faced by the supervisor, but this autonomy may also be the result of a conscious desire to maintain morale. Babychuk and Goode (1951:687) conclude their study with the statement that "self determination of work conditions is the prime determinant of high morale."

When one considers that the National Research Council on Psychological Factors in Morale defines morale as:

> "...the condition of a group where there are clear and fixed goals (purposes) that are felt to be important and integrated with individual goals; where there is confidence in the means of attainment, in leaders, associates and finally in oneself, where group actions are integrated and co-operative; and where aggression and hostility are expressed against the forces frustrating the group rather than toward the individuals within the group..."
> (French,1941:376)

And, when one also considers that group cohesiveness "refers to the degree to which members are motivated to remain in the group" (Shaw,1971:192), it follows that group cohesiveness would be a prime requisite for the existence of high morale. It has even been advocated that "analysis of disruption and cohesion is equivalent to an analysis of what is commonly meant by the rather vague term morale." (French,1941:376)

If one accepts the notion that the existence of a high level of group cohesiveness is at least indicative of high morale, then it appears that part of a supervisor's job is to encourage the development of a high level of group cohesiveness. If the analysis of previous studies (eg. Trist and Bamforth,1951; Gouldner,1954 and Trist, Higgin, Murray and Pollack,1963) is accepted, then it appears that one method of facilitating the growth of group cohesiveness is by allowing a great deal of worker autonomy. If a supervisor perceives a hazardous situation as undermining the morale of his men, he may allow them greater amounts of autonomy, hoping to foster the development of group cohesiveness and, by so doing, increase job satisfaction and productivity.

White (1972:11) suggests that worker autonomy may act as compensation for those employed in hazardous occupations and, Jack Haas, a sociologist at McMaster University provides some substantiation for this suggestion. During his sabbatical, Haas decided to undertake a participant observation study of high steel ironworkers. His aim was to discover the "real" feelings of these ironworkers about the fact that they worked in a dangerous environment. Near the end of his stay with them, he discovered that they were indeed afraid, but much of his work discusses how they coped with danger. According to Haas (1975:19-24), one of the primary ways that the effects of danger are countered is through a great deal of worker autonomy. If a man did not want to go up to work that day, nothing was said. Supervisors did not press for higher productivity. In this case, worker autonomy appeared to indeed be a form of compensation for the dangers faced by the ironworkers.

In the literature reviewed to date, it appears that both autonomy and group cohesiveness seem to be important means of coping with danger. High levels of autonomy may allow group cohesiveness to develop and both group cohesiveness and autonomy may have positive effects on job satisfaction and productivity.

Of particular concern to a study of miners, is Robert Blauner's important article entitled "Work satisfaction and industrial trends in modern society". After a comprehensive review of the literature on job satisfaction, Blauner found that certain groups (eg. printers, miners, fishermen and loggers) consistently evidenced higher job satisfaction rates than did most other occupational groups. In attempting to account for these findings, Blauner isolated certain factors found amongst all those groups evidencing high satisfaction scores and the contemporary notion of an occupational community was born. These common factors form the defining characteristics of an occupational community and are as follows:

> "(1) Workers in their off hours socialize more with persons in their own line of work, than with a cross section of occupational types.
>
> (2) Workers talk shop in their off hours.
>
> (3) The occupation is the reference group, its standard of behavior, its system of status and rank, guide conduct".
>
> (Blauner,1974:247)

Two further characteristics, according to Blauner (1974:247), that facilitate the development of occupational communities are: "(4) spatial isolation and (5) peculiar hours of work". Based on his observations, Blauner notes that "occupational communities rarely exist among urban factory workers".

Many studies dealing with miners (eg. Friedmann and Havighurst,1954; Gouldner,1954; Dennis, Henriques and Slaughter,1956 and Williams,1962), demonstrate that miners fulfill the necessary criteria for the development of an occupational community. In addition to these studies, personal experience has affirmed the existence of an occupational community amongst some miners in Canada. What has also been revealed through personal experience is that extensive on-the-job contact appears to carry over into extensive off-the-job contact, so that it may be suggested that a high level of group cohesiveness amongst miners may be reflected in the existence of a strong occupational community. In reality, it would be difficult to discover whether off-the-job contact leads to greater group cohesiveness or group cohesiveness leads to greater off-the-job contact, but it would most probably be correct to assume that the existence of one reinforces the other.

An examination of the preceding literature dealing with mining suggests that autonomy, group cohesiveness and the occupational community are important aspects of a miner's total environment. In effect, these aspects of a miner's environment may offer the kind of support necessary to cope with danger. Unfortunately, many of the studies previously noted are qualitatively oriented rather than quantative and, although rich in detail and highly suggestive theoretically, provide minimal empirical support for their reported relationships. To gain greater empirical justification for some of the relationships outlined, and to discover possible additional factors worthy of consideration, it becomes necessary to supplement the literature reviewed to date with an examination of research dealing with dangerous or threatening situations, as well as research which examines in greater depth the crucial variables of autonomy and group cohesiveness. The intention of such a strategy is not to provide an all encompassing review, but rather to consider factors that may be applicable in the mining environment.

Dangerous or Threatening Situations

The social psychological literature is rich with studies of people's reactions in threatening situations. Of considerable import to this thesis is a series of classic experiments undertaken by Stanley Schacter (1959) to examine the effects of fear on affiliative behavior. Dividing his population into experimental and control groups, Schacter created a threatening situation amongst members of the experimental group by leading them to believe that they would receive a series of intense electric shocks that would be painful, but would produce no permanent damage. The control group was led to believe that they would receive a series of weak shocks that would result in only a mild tingling sensation. Both members of the experimental and control groups were told that there would be a ten minute break before the start of the experiment, and they could wait alone or wait with some of the other subjects. Those expecting the intense series of electric shocks and presumably, the most fearful, chose to wait with other subjects significantly more often than did those expecting a series of weak shocks. For purposes of this thesis, it would appear that in dangerous or threatening situations, people seek out the company of others.

In attempting to find out why people seek the company of others, Schacter was faced with the question of whether or not fearful subjects would choose any social contact or would prefer to only associate with those also expecting electric shock. Adopting the same basic procedures outlined earlier, Schacter divided his fearful subjects (those expecting an intense series of shocks) into two groups. One group was offered the original choice of waiting alone or with others also expecting shock, while the other group was offered the choice of waiting alone or with others _not_ expecting any electric shocks. A significant difference emerged in the degree of affiliation evidenced in the two groups. Subjects allowed to wait with others also expecting electric shocks chose this alternative with a much greater frequency than did those subjects given the choice of waiting with others not expecting electric shocks. It appears that people in threatening situations choose to associate with others in similar circumstances. In attempting to account for these findings, Schacter eventually relies on two interrelated explanations: (1) a need for social comparison and (2) fear reduction. By comparing his reactions to others, an individual is able to ascertain the appropriateness of his reactions and by so doing decrease fear.

The fact that those in similar circumstances choose to affiliate with each other for purposes of social comparison and fear reduction, might very well explain why miners have traditionally evidenced a strong sense of solidarity. Those in similar circumstances may provide a source of support and thus, aid in coping. Justification for this latter point can be found in other studies (cf., Pepitone and Kleiner,1956 and 1957 and Kissel, 1965). For example, Kissel, using a psychological measure of anxiety, found that the mere presence of another person could reduce anxiety and in a series of experimental group studies, Pepitone and Kleiner (1956 and 1957) demonstrated that external threats have a tendency to draw cohesive group members even closer together. Results of this nature, when applied to miners, suggest that dangerous working conditions might encourage the development of a high level of group cohesiveness and this cohesiveness will become stronger if the danger persists.

Additional research conducted in the military offers further clarification. Many studies of psychological orientation (Grinker and Spiegel,1943 and 1945; Kardiner and Spiegel,1947 and Janis,1951, 1958 and 1968) point out that combat crews develop intense solidarity. Grinker and Spiegel (1945:21-22) express a common theme when they note: "The interpersonal threat of injury from the enemy, affecting all alike, produces a high degree of cohesion so that personal attachments throughout the unit become intensified". Certain researchers (Grinker and Spiegel,1943 and 1945; Kardiner and Spiegel,1947 and Janis,1958) have even gone so far as to suggest that the intensity of these bonds is such that removal from a combat group may result in various forms of neurosis amongst certain psychologically predisposed individuals.

In attempting to assess the development of group cohesiveness amongst combat personnel, Stouffer et al., (1949:96) commented that:

> "Combat always consists in one group fighting an enemy, there follow certain features which make for social cohesion... combat involves a major threat from outside to the group as a whole...the threat does not automatically result in group solidarity...it results in a drastic increase in mutually supportive action among members of the group."

Their caution that the simple existence of a threat may not immediately produce group cohesiveness is worthy of consideration. Exactly what is meant by this statement becomes much clearer when they (Stouffer et al., 1949:169) note:

> "The goal of survival also enforced close teamwork with others in the outfit, the life of each depended as much on the other's actions as his own, so from this goal sprang much of the feeling of close mutual dependence."

It would appear that the threat must be of such magnitude that individual coping is impossible and yet of sufficient duration to allow the realization of mutual dependency to develop amongst members of the group. Both miners and combat personnel exist in a state characterized by mutual dependency. Each individual depends for his survival on the actions of others.

A crucial difference between miners and combat personnel may concern the nature of the threat. When someone is shooting at you, it is fairly easy to perceive the situation as dangerous, but it is somewhat more difficult to consider the possibility of contracting a disease twenty years from now as dangerous. In the case of mining accidents, it is easier to attribute the cause to the carelessness of an individual rather than to an unsafe environment. While such may also be the case with combat personnel, situations may exist where a fatality obviously results not from individual carelessness, but from the nature of the threat itself. We have often heard, via the media, explanations of a combat fatality summarized by: "His number was up." In essence, although both combat and underground mining are dangerous activities, the possibility exists that underground miners may not perceive their environments as dangerous. An individual's perceptions may therefore become an important aspect of the coping process and thus, worthy of consideration.

Perception

Gilbert F. White (1974:4), in his work dealing with natural hazards, defines perception as "(t)he individual organization of stimuli relating to an extreme event or human adjustment". His interests concerned "how people viewed the occurrence or threat of the extreme event and of the opportunities open to them in coping with the event".

Our concern with miners and dangerous environments closely parallels the interests of White. It seems intuitively correct to assume that a given perception of danger will condition the opportunities available for coping, but it is just as possible that the opportunities available in the environment condition individual perceptions. As a result, a given perception may be determined by the actor's awareness of alternative courses of action, his perceived competence in following these alternative courses, and the economic and social consequences of such action (White,1974:5). The formation of a given perception may be a dynamic process - subject to change. With this knowledge in mind, it appears that a paramount concern is the relationship between the objective fact of danger and the degree to which respondents perceive this danger.

Unfortunately, the literature does not adequately differentiate between the objective fact of danger and the subjective perceptions of reality in the actor.

Gouldner (1954:116-131) maintains that miners are aware they work in a dangerous environment and Dennis, Henriques and Slaughter (1956:38) concur, leading one to assume that objective and subjective reality are comparable. But, contrary to this view, Janis (1951:124) reports some intriguing results from his studies of bombing raids during World War II, pointing out that:

> "When a population is exposed to a series of false alarms or light raids in which there is little or no objective danger, fear responses tend to extinguish...When a population is exposed to a series of heavy and relatively dangerous raids, fear responses again subside."

Related to this view, Mechanic (1974:40) notes that "part of the process of adaptation involves the subtle restructuring of the individual's attitudinal set toward events that have taken place". Obviously, it would be most interesting to discover if miners have an accurate perception of the reality they face. It is possible that an inaccurate perception of reality may offer a means of coping with danger.

If a given perception may be conditioned by forces in the environment, it appears that closer examination of these forces in the environment is warranted. One of the most important aspects of a miner's working environment is the amount of autonomy he is given. Earlier, it was suggested that high levels of autonomy could act as compensation for the dangers faced by miners, as well as permitting the development of group cohesiveness to occur. It was also suggested that high levels of autonomy could result in positive increments in job satisfaction and productivity either directly, or by fostering the development of group cohesiveness. In the next section, emphasis will be placed on clarifying some of these relationships, by examining certain selected empirical studies.

Autonomy

White (1972:1) notes that a recurrent theme in the industrial and organizational literature has stressed that "if a worker is given control over the things he does in his work role, he will be more satisfied and productive in that role". This is exactly the argument advanced by Gouldner (1954) in his attempt to account for the greater satisfaction of miners. Other researchers dealing with miners (Trist and Bamforth, 1951 and Trist, Higgin, Murray and Pollack,1963), have reported increased job satisfaction and productivity rates when workers were given greater control over their work.

This theme is by no means unique to mining. In an experiment, Strauss and Bavelas (1955) allowed eight girls, in a toy factory, to have a say about their environment and pace of work. A fan was brought in and the leader was allowed to adjust the speed at which the belt passed by. Productivity and satisfaction increased.

In another experiment in an office setting, Morse and Reimer (1956) subjected two groups to experimental treatment. One group had responsibility delegated to them and the other group was hierarchially controlled. Satisfaction in the group given responsible autonomy increased on all indicators (reported satisfaction with all supervisors was high, absenteeism and turnover were low) and declined in the hierarchially controlled group. Interestingly enough, productivity was greater in the hierarchially controlled group even though the group given responsible autonomy had increased its productivity. Quoting Tannenbaum in attempting to account for this finding, White (1972:15) notes that "...the advance in productivity in one program occurred because the clerks wanted to produce at a higher level; in the other, it occurred because the clerks had to".

Fleishman (1965) noted that the introduction of model changes in a dress manufacturing company resulted in a drop in production. The research problem that developed concerned whether the drop in production resulted from skill-related or attitudinal factors. Did it really take a long time to learn how to make the new dresses or was it a question of resistance to the change from one model to another? If resistance was occurring, what was causing it? Allowing the girls a measure of say in planning the model changes revealed that "attitude factors rather than skill differences" (Fleishman,1965:263) were responsible for the drop in productivity and by allowing participation to occur, productivity could be enhanced.

These studies suggest that both job satisfaction and productivity can be enhanced by increasing the amount of autonomy given to workers, although it must be noted that productivity can be enhanced by means other than an increase in autonomy (cf.,Morse and Reimer,1956). Of course, the crucial difference between the study undertaken by Morse and Reimer (1956) and the one undertaken by Fleishman (1965) may concern the degree to which the co-operation of the workers was necessary. The office workers in the Morse and Reimer study, if closely supervised, were probably incapable of much resistance for the tasks they performed contained set procedures and a minimum of uncertainty. The fact that model changes were introduced in the Fleishman study, no doubt resulted in a certain amount of uncertainty as to the procedures to be employed and the amount to be produced. When uncertainty exists, the co-operation of workers become important and their resistance possible. Attitudinal factors may be crucial concerns in the development of increased productivity where an element of uncertainty exists.

Numerous researchers have concentrated primarily on the relationship between worker control and job satisfaction. Lipset et al.(1954), for example, attributed the high job satisfaction of printers to the great control they exerted over their jobs. Walker and Guest (1954), and Chinoy (1955) in their study of automobile workers stated that the major complaint voiced by these workers was their lack of control over the work process. When one considers that the vast majority of these workers expressed a desire to leave the autoplants, it could be assumed that this dissatisfaction stemmed from their lack of control over the work process.

The evidence mustered to date, suggests that high levels of autonomy will automatically result in higher levels of both job satisfaction and productivity. Of course, as we attempted to demonstrate earlier, the relationship between autonomy and productivity may be dependent upon such factors as the element of uncertainty in the working environment. Perhaps, a closer examination of the relationship between autonomy and job satisfaction is also in order.

In what White (1972:24) considers to be one of "the most sophisticated" research designs, complete with "adequate sampling and measurement techniques", Turner and Lawrence (1965:51) found only a slight, positive, non-significant relationship between autonomy and job satisfaction.

Shepard (1973:281) notes that "...job satisfaction seems to be much more closely related to the 'objective' factor of specialization than to the 'subjective' factor of autonomy discrepancy". In essence, Shepard is asserting that the autonomy inherent in a job is a better predictor of job satisfaction than the perception of autonomy.

Using a sample of university students in an experimental study of autonomy in task oriented groups, Trow (1956:361) concluded that "the autonomy - satisfaction relationship was found to be strongest among those subjects with a high need for autonomy".

Even a cursory appraisal of three studies such as these, reveals that the autonomy-satisfaction relationship may be very weak or non-existent; dependent upon a need for autonomy; or a structurally, rather than psychologically, determined relationship.

As investigative techniques become more sophisticated, it is increasingly difficult to state an unqualified relationship between autonomy and job satisfaction. Evidence of this can be found in White's (1972) work. In one of the most exacting studies of the relationship of autonomy on job satisfaction and productivity, he found "that there is no significant relationship between autonomy and satisfaction" (:242) and although some of the measures of autonomy correlated significantly with the total measure of effectiveness, the variance explained in effectiveness by these autonomies is slight" (:243). Surprisingly enough, when dealing with one of the sub-types of autonomy, he found "a weak negative trend" (:242) between autonomy and satisfaction although, when controlling for persons with low autonomy, he found autonomy explaining much more of the variance in effectiveness and satisfaction (:242-243). These results tend to give credence to the notion first advanced by Trow (1956) that the autonomy-satisfaction relationship may be mediated by a need for autonomy as well as extending it to include the autonomy-productivity relationship.

Although the major thrust of research dealing with autonomy has concentrated on its effects on satisfaction and productivity, interesting questions emerge as to the generation of autonomy and/or its effects on other situational variables. Earlier, it was noted that Haas (1975) found autonomy to be a virtual consequence of the dangerous conditions faced by high steel ironworkers. It was also noted by White (1967:32-33) that supervision in the mines tended to stress both productivity and morale. The position advanced at that juncture proposed that the dangers faced by miners might give rise to high levels of autonomy and that this on-the-job freedom would allow the development of greater group cohesiveness. If group cohesiveness was at least indicative of high morale, then the supervisor, whose job it was to maintain high morale, might consciously act to insure that sufficient levels of autonomy were present to enable group cohesiveness to develop. Turner and Lawrence (1965:64) give some empirical justification for this position by noting that autonomy and work group satisfaction were "strongly related". Substantiating his position with reference to Sayles' The Behavior of Industrial Work Groups, William Foote White (1961:543) provides further support for the position advocated here by noting that "individuals whose job situation permits them to interact readily will tend to be more cohesive than those whose job situation makes interaction difficult".

Some support exists for the notion that high levels of autonomy will have positive impact on both job satisfaction and productivity (effectiveness)[1], but this support is not wholehearted and in some instances depends on certain other factors (eg. a need for autonomy). No hard empirical evidence exists, beyond the suggestions advanced by White (1967) and White (1972) and the impressionistic account of Haas (1975), to suggest that autonomy acts as compensation for the dangers faced on the job. Some evidence (White,1961 and Turner and Lawrence, 1965) does, however, suggest that there is a relationship between autonomy and group cohesiveness.

In earlier considerations of group cohesiveness, it was suggested that danger and the existence of a strong occupational community, with extensive off-the-job contact amongst workers, could foster the development of cohesiveness on-the-job. It was also suggested that high levels of group cohesiveness might be reflected in high levels of job satisfaction and productivity (effectiveness). The importance of danger as a formative element in the development of group cohesiveness has already been investigated, but in order to more adequately assess the remaining relationships outlined, it becomes necessary to examine additional research dealing with the formation and effects of group cohesiveness, and this becomes the subject of the next section.

Group Cohesiveness

One of the most exhaustive studies of group cohesiveness was undertaken by Stanley Seashore in Group Cohesiveness in the Industrial Work Group. In attempting to account for the existence of cohesiveness, Seashore found that similarity in age and educational level exerted no influence (Lawrence and Seiler,1971:194). These results contradict Keedy's conclusion (1956:330) that "homogeneity of physical, cultural, ethnic, marital and education of the social group is associated with small group cohesiveness". What Seashore did find was that cohesiveness was positively related to perceived job prestige and length of service, but inversely related to group size (Lawrence and Seiler,1971:194). In addition, he noted that "heightened interaction is positively related to group cohesiveness" (Seashore, 1954:26). Collaborating support (cf.,French, 1941; Homans,1950; Back,1951 and Lott and Lott,1961) also exists in the literature.

On the basis of these findings, it would appear then, that a consensus exists only with respect to the importance of increased interaction for the development of group cohesiveness, but even this finding is subject to debate. Seashore (1954:26), himself, declares that "(e)ven though heightened interaction, in some instances, may accompany high cohesiveness, there is no basis for assuming it is a necessary relationship" and Cartwright and Zander (1960:80) proclaim that "there is no convincing evidence, however, that interaction which is unpleasant will make persons better like one another".

Although these points are well taken, much of the literature on mining reviewed to date (Trist and Bamforth,1951, Friedmann and Havighurst,1954; Gouldner, 1954; Dennis, Henriques and Slaughter,1956; Williams, 1962; Trist, Higgin, Murray and Pollack,1963; Blauner, 1974 and Leyton,1975) suggests that miners form highly cohesive work groups and have extensive contacts with each other off-the-job. Ample evidence (cf.,Friedmann and Havighurst,1954; Gouldner,1954 and Dennis, Henriques and Slaughter,1956) exists to suggest that the interaction off-the-job is quite pleasant for many miners, and although there may exist instances where such is not the case, it would appear that, as a general rule, heightened interaction amongst miners will lead to greater group cohesiveness.

There is every reason to believe, based on the same literature, that the existence of group cohesiveness leads to greater off-the-job contact in precisely the manner Homans (1950:119) describes when he says "interaction between persons leads to sentiments of liking, which express themselves in new activities, and these in turn mean further interaction". Additional research (French,1941; Back,1951 and Lott and Lott, 1961) supports this position. If one can accept the notion that "heightened interaction" may foster the development of group cohesiveness, then it appears that this "heightened interaction" may be the mechanism necessary to explain the autonomy-cohesiveness relationship as well as the one between the occupational community and cohesiveness. For example, high levels of autonomy may allow "heightened interaction" amongst workers to occur and, by so doing, permit a high level of group cohesiveness to develop. Many of the defining characteristics of an occupational community involve extensive off-the-job contacts and extensive off-the-job contact is tantamount to "heightened interaction". If "heightened interaction" fosters the development of group cohesiveness so, too, must extensive off-the-job contact. Obviously, these relationships assume that any interaction occurring is pleasant for those involved.

Considerable attention, in this review, has focussed on factors giving rise to the formation of group cohesiveness, but little attention has been directed to the impact of cohesiveness on other variables. It has been suggested that group cohesiveness is an important way of coping with danger and explanations of why cohesiveness is important have tended to point out that anxiety may be reduced through social comparison, but in Seashore's (1954) study he observed that cohesiveness did not necessarily result in higher productivity but was dependent on a feeling of confidence in management. Such may be the case with miners. The existence of cohesiveness may not necessarily of, and by itself, reduce the effects of danger if workers believe that management is not doing all in its power to insure a safe environment. One means of exploring this possibility is by examining the effect of group cohesiveness upon job satisfaction with the assumption being that job satisfaction is indicative of success in coping with danger and also indicative of the confidence workers express in management.

The literature dealing with the effect of group cohesiveness on job satisfaction is fairly consistent in maintaining that high levels of group cohesiveness are associated with high levels of job satisfaction. Van Zelst (1952 a and b), for example, undertook a study whereby some carpenters and bricklayers were allowed to choose their own partners and others were not. Turnover, labour and material cost declined and expressed job satisfaction increased amongst those allowed to choose their own co-workers. Similar results were noted when Marquis et al.(1951) undertook a comprehensive study of seventy-two decision making conferences. Participants were observed and a cohesive-index computed based on behavioral patterns indicating the amount subjects liked each other. Those who scored high on the index of cohesiveness also indicated, by use of a questionnaire, that they were more satisfied with the group's performance than those who scored low on the index of cohesiveness.

Exline (1957) conducted a laboratory experiment where subjects in one group were told that all the members were well matched and should form congenial relationships, while subjects in the other group were told that the members were not well matched and harmony was not to be expected. Members of the congenial group expressed greater satisfaction with the group's progress than did the non-congenial group.

Findings of this nature are not solely confined to studies employing experimental or quasi-experimental research designs. Gross (1954), in his study of Air Force groups, found a positive relationship between cohesiveness and satisfaction, and Turner and Lawrence (1965) found the relationship not only to be positive, but highly significant.

It appears that group cohesiveness does have a positive impact on job satisfaction. Certain of the studies noted previously (eg. Van Zelst,1952a and b and Seashore,1954) also suggest that group cohesiveness has a positive impact on productivity (effectiveness), although this productivity may be dependent upon certain other factors (eg. confidence in management).

Summary

In this chapter, it was demonstrated that the mining environment is indeed dangerous. Given the fact that miners face the very real possibility of injury and death, the question that arose concerned how they coped with danger. In an investigation of the literature dealing with miners; autonomy, group cohesiveness, and the occupational community emerged as potentially important factors in coping with danger.

Subsequent examination of literature dealing with dangerous or threatening situations, revealed not only the importance of group cohesiveness as a means of coping with danger, but also brought to light the potential importance of individual perceptions. Could an inaccurate view of the danger present in the work situation, aid a miner in coping with that danger? Evidence on this point is conflicting. Certain researchers (Gouldner,1954 and Dennis, Henriques and Slaughter,1956) maintained that miners would perceive their jobs as dangerous, while others (Janis,1951 and Mechanic,1974) suggested the importance of inaccurate perceptions in coping with danger. Obviously, clarification of this point is necessary.

Particular attention, throughout the review of the literature, was paid to the industrial and organizational studies dealing with autonomy and group cohesiveness. Emphasis was placed upon discovering relationships between these components and their effects upon other variables. Although subject to qualifications, both autonomy and group cohesiveness appeared to have positive impact on job satisfaction and productivity and, both autonomy and the occupational community (expressed through off-the-job contact) appeared to be positively related to group cohesiveness.

In the next chapter, based on the literature reviewed in this chapter, a model designed to facilitate research will be presented. Emphasis will be placed on explanation of the model and the various components involved.

Notes

1. Effectiveness appears alongside productivity in brackets because it is not the same thing as traditional measures of productivity (see chapter 2 for a more detailed explanation), but the empirical evidence in support of relationships involving productivity and other components may be applied to effectiveness as well for, traditional measures of productivity are contained within the effectiveness designation. The component "effectiveness" is a clarification and extension of traditional notions of productivity.

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Chapter 2

Research Problem and Hypotheses

Introduction

In chapter 1, understanding how underground miners cope with working in a dangerous environment emerged as the goal of this thesis. On the basis of a literature review, autonomy, group cohesiveness, individual perceptions and the occupational community emerged as potentially important factors in coping with danger. In the course of the literature review, a series of relationships between autonomy, group cohesiveness and the occupational community were identified. It was also discovered that autonomy and group cohesiveness, if certain additional factors were considered (see chapter 1 for clarification), appeared to have positive impact on job satisfaction and productivity (effectiveness).

In this chapter, these components and the relationships between them, will be presented in a research model. The major components of that model will be examined and defined, specific hypotheses outlined, and potential problem areas identified. The actual operationalization of the components will be discussed in the next chapter.

The Research Model

Figure 2-1 represents the model generated to guide research into how miners cope with working in a dangerous environment. Obviously, this model rests on certain assumptions. In the next subsection, emphasis will be placed on bringing these assumptions to light.

Assumptions

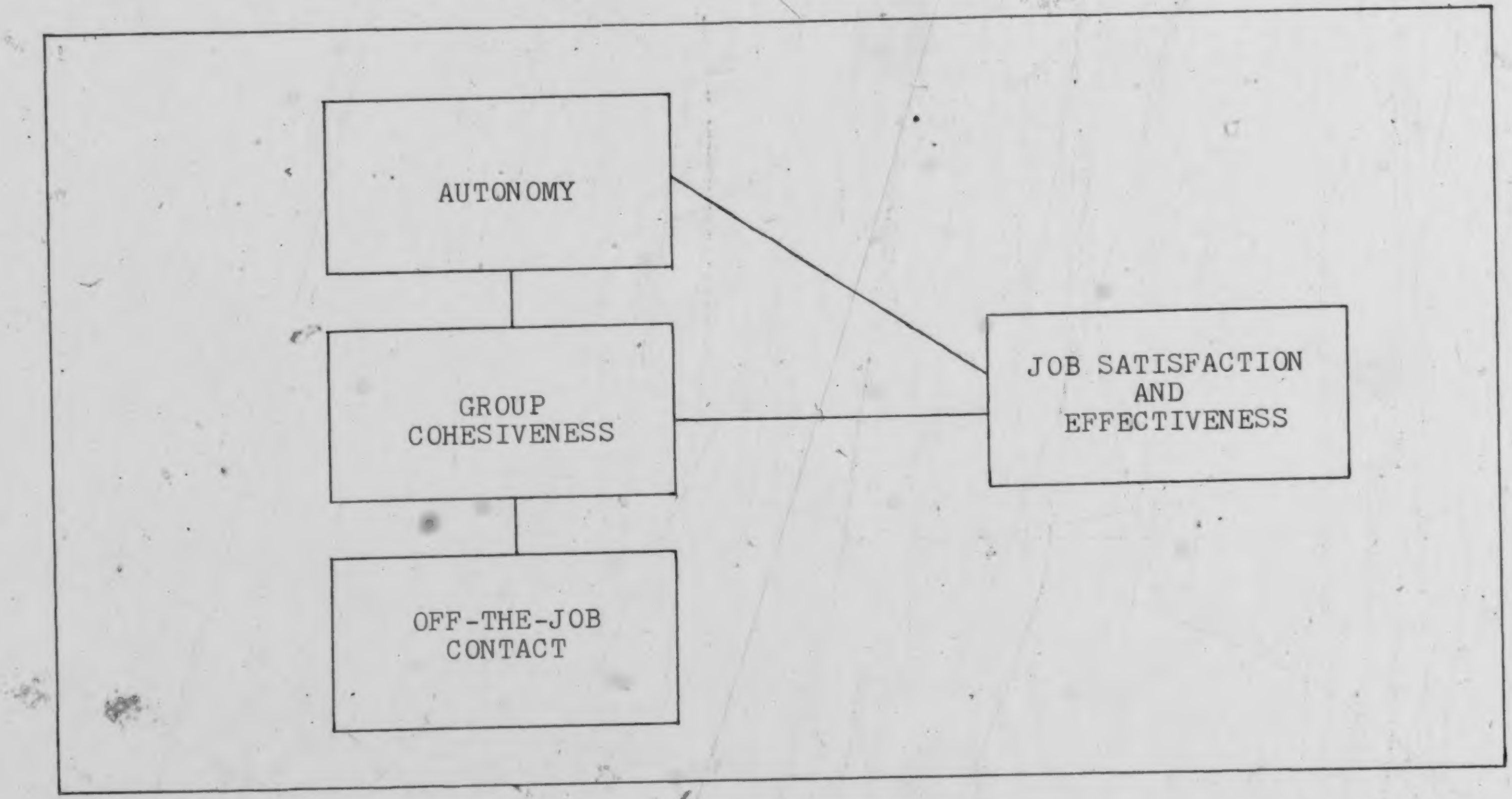
Perhaps the most crucial assumption in this model, concerns the evaluation of successful coping. It is assumed that individuals who score high on measures of job satisfaction and effectiveness are coping successfully with danger.

Before elaboration of this point is made, it would be worthwhile to note that the assumption that is not being made here, is that job satisfaction and effectiveness are equivalent. Although certain studies (eg. Trist and Bamforth,1951; Van Zelst,1952a and b; Strauss and Bavelas,1955; Morse and Reimer,1956 and Trist, Higgin, Murray and Pollack,1963) appear to suggest that productivity and satisfaction are related, no studies

FIGURE 2-1

THE RESEARCH MODEL

RELATIONSHIPS EXAMINED UNDER DIFFERENT CONDITIONS OF DANGER


AUTONOMY
GROUP COHESIVENESS
OFF-THE-JOB CONTACT
JOB SATISFACTION AND EFFECTIVENESS

suggest that they are equivalent.

This distinction becomes important in an evaluation of successful coping, for an individual may conceivably be satisfied with his job, but if he is not an effective worker, he may not have a job to be satisifed with. Conversely, an individual may be a highly effective worker and yet, loathe his job. This loathing may eventually see him leave a particular workplace. Given the fact miners work in an organization, successful coping, therefore, has a two fold nature. The worker must be personally satisfied with his job, and the organization must be satisfied with his performance.

In the first chapter, mention was made of the potential importance of individual perceptions as a means of coping with danger. Could an inaccurate perception of the danger present in the environment aid a miner in coping with that danger? Although specific instances of this phenomenon are important, what may be most important is discovering if a given, generally-held, perception of danger results in positive or negative consequences for job satisfaction and/or effectiveness. If autonomy, group cohesiveness, and off-the-job contact are important means of coping with danger, then it appears that the relationships between these components themselves, and with job satisfaction and effectiveness, should become stronger under conditions of high danger.

Unfortunately, the potential importance of perception cannot be dismissed this easily. The crucial question concerns the measure, or measures, of danger employed. Hypothetically, miners working in a relatively safe environment may consider their jobs to be very dangerous. If danger is measured according to some objective criteria, these miners, categorized as working in a safe environment, may exhibit responses similar to those working in a dangerous environment and, by so doing, create a great deal of confusion. For, in such a situation, it would not be inconceivable to have little difference exhibited between those working in a dangerous situation and those working in a relatively safe environment. Making logical assumptions of this nature, results in an endless series of possibilities. Obviously, what is needed is a measure of danger based on individual perceptions as well as objective criteria. By treating danger as a control condition in this model, it becomes possible to compare the importance of various components and relationships under conditions of danger as perceived by respondents as well as objectively determined. Such a strategy provides the opportunity of discovering if inaccurate perceptions of danger are wide-spread and, if so, their importance as a coping mechanism.

Two additional assumptions about the research model deserve attention. They are: (1) This model is a heuristic device derived from the review of the literature and the actual relationships between the components may be far more complex than the model would indicate (see Chapter 1 for a discussion of additional factors mediating, or qualifying, these relationships). (2) A high level of off-the-job contact with fellow workers, during which work is discussed, is indicative of the existence of an occupational community.

In this section dealing with the assumptions underlying the formation of the model, numerous references have been made to relationships contained within the model. In the next subsection, these proposed relationships will be identified and the empirical justification for them presented.

Relationships

The following format offers the best means of summarizing the relationships presented in the model and the empirical support guiding their formation.

Statement 1: The greater the level of autonomy, the greater the level of group cohesiveness.

Empirical Support: Babychuk and Goode,1951; Whyte, 1961; Turner and Lawrence,1965 and White,1972.

Statement 2: The greater the level of group cohesiveness, the greater the level of off-the-job contact.

Empirical Support: French,1941; Friedmann and Havighurst,1954; Seashore,1954; Lipset, Trow and Coleman,1956; Dennis, Henriques and Slaughter,1956; Lott and Lott,1961; Williams,1962 and Blauner,1974.

Statement 3: The greater the level of autonomy, the greater the level of job satisfaction and effectiveness.

Empirical Support: Trist and Bamforth,1951; Gouldner, 1954; Lipset, Trow and Coleman, 1954; Walker and Guest,1954; Chinoy, 1955; Strauss and Bavelas,1955; Morse and Reimer,1956; Trist, Higgin, Murray and Pollack,1963; Fleishman, 1965 and Turner and Lawrence,1965.

Statement 4: The greater the level of group cohesiveness, the greater the level of job satisfaction and effectiveness.

Empirical Support: Gross,1954; Marquis et el.,1951; Van Zelst,1952a and b; Exline,1957; Trist, Higgin, Murray and Pollack, 1963 and Turner and Lawrence,1965.

Although, these relationships represent aspects of the research to be undertaken, they do not comprise the entire thrust of the research. In the next section, a more complete outline of what will be attempted will be presented.

Hypotheses

The statements presented in the preceding section constitute hypotheses and will be subject to empirical validation. The simple discovery of a significant relationship is, however, meaningless in an attempt to understand how miners cope with danger, unless these relationships are examined under different conditions of danger and some idea of their importance for coping with danger is established. As was pointed out earlier, simply examining these relationships under conditions of high and low danger, without considering a possible lack of correspondence between how danger is perceived (the subjective reality of the actor) and its actual existence (the objective fact of danger) may result in confusion, and mask the possible importance of inaccurate perceptions in coping with danger. Furthermore, in Chapter One, it was noted that miners face not only the possibility of injury and death due to sudden accidents, but the threat of occupational diseases such as lung cancer and silicosis as well. Clearly, these two types of danger are, in some respects, qualitatively different and any measures of danger employed, must take cognizance of this fact for, inaccurate perceptions of the danger present may be important considerations given one type of danger, and unimportant given another type of danger.

With concerns of this nature in mind, it appears that the simple testing of hypotheses is only part of the task of discovering how miners cope with danger. What also becomes of importance, is the necessity of adequately differentiating and controlling for not only different conditions of danger, but different measures and types of danger. It naturally follows that some of the research to be undertaken in this study must be of an exploratory and descriptive nature. In keeping with this end, perhaps the most appropriate strategy involves providing a precise definition of the various components in the model and by so doing, provide a measure of analytical clarity as a foundation for subsequent operationalization.

The Model Components

In this section, analytical distinctions involved in, and definitions of, the various model components will be considered. In the first subsection, an attempt to further clarify important aspects of the danger control condition will be made.

Danger

To date, considerable attention in this study has been devoted to the concept of individual perceptions and their potential importance as a means of coping with danger. A miner may work in a situation that is, in actuality, very dangerous, but not regard it as such. In this instance, an inaccurate perception of danger may form the basis of his ability to cope. A different miner, working in a relatively sa[illegible] area, may regard his job as extremely dangerous. His inaccurate perception may prevent him from coping.

Analytically, two important facets emerge in a discussion of danger. These are: (1) The objective fact of danger. (2) The subjective assessment of those objective facts. Both aspects are important. Attempts will be made to discover the relationship between objective fact and subjective assessment, but for purposes of definition, guidance will be taken from the work of W. I. Thomas who noted that "if men define situations as real, they are real in their consequences" (Bulmer,1978:299), so that danger, in this study, becomes defined as a condition of real or perceived threat to life or limb.

Ham (1976) suggests the existence of two types of danger. "Type I Danger" refers to the possibilities of accidents and "Type II Danger" refers to possibilities of contracting occupational diseases such as silicosis and lung cancer. Both types of danger represent threats to life and limb, but Type I Danger represents an immediate concern, for the potential hazards such as loose rock, slippery footing and speeding machinery are clearly visible in the day-to-day working environment. Type II Danger involves contracting occupational diseases which require a period of exposure and, as such, are for many workers, a future rather than an immediately visible threat. Given this distinction, respondents may not display a consistency of perception between Type I and Type II Danger.

Although no definitional distinction will be made between the objective and subjective aspects of danger, this will not be the case when danger is operationalized. To gain information about the perceptual aspect of danger, respondents will be asked a series of questions designed to discover their feelings about how dangerous they consider their jobs to be, not only in terms of the possibilities of accidents, but also with regards to occupational diseases.

The discovery of an objective measure of danger represents somewhat more of a problem. In the first chapter, evidence (eg. Ham,1976 and The Globe and Mail, July 5,1978:33) was presented to show that the mining environment is indeed dangerous, but this evidence is of a general nature. It does not tell whether or not an individual miner is working in a dangerous environment for differences exist from one workplace to another. The fact that underground miners pay more for insurance than do most other occupational groups (cf., Manufacturer's Life Tables of 1977) only indicates, in a general sense, that miners are considered to belong to a high risk occupation. What is needed is a measure ascertaining the actual danger faced by an individual worker. Perhaps, the most appropriate method would be to have the immediate supervisor rate the amount of danger faced by a given worker in comparison to the danger faced by others on the same crew. This strategy allows direct comparisons between objective and subjective aspects of danger to be made, as well as allowing the relationships outlined in the model to be examined under objective and subjective conditions. Clearly, with such possibilities, an opportunity exists to discover the importance of inaccurate perceptions for coping with danger.

With considerable attention being directed to perceptions, certain other factors of importance for coping with danger have been neglected. Autonomy is one of these neglected factors and forms the object of discussion in the next subsection.

Autonomy

Brief and Aldag (1975:182) have defined autonomy as "the extent to which employees had a major say in scheduling their work, selecting the equipment they would use, and deciding on procedures to be followed." Mulder (1963:53), notes that autonomy has a social character. Although, perhaps not intended, the definition proposed by Brief and Aldag does not fully explore this dimension. By restricting their definition to the amount of control over the work process, excessive emphasis may be placed on the technological barriers to the workers' exercise of autonomy. Surpervision, certain dominant individuals and an employee's own work group may restrict the amount of control he can exercise in the performance of his job, irrespective of technological constraints.

Katz (1965:20) defines autonomy as "independence from external control". Although possessed of insight, this definition is so broad and non specific that the working environment is not differentiated from any other environment. Such a definition, without specifying potential sources of external control, becomes analytically bankrupt.

White (1972), in probably one of the most cogent treatments of autonomy, investigated factors that impinged upon the individual's freedom - while not only performing his work tasks, but during slack periods as well. The realization of the importance of the individual's ability to exercise control over his time and activities when not actually performing the duties required by his job, constitutes an important, previously neglected dimension of autonomy.

White (1972:92) defines autonomy as "(t)he amount of discretion or personal freedom that a worker can exercise in the performance of his work role."

This definition, although still a general one, places autonomy squarely in the working environment and as such, will be adopted in this study.

White's conceptual work with autonomy was not confined solely to pointing out the existence of a neglected dimension or proposing a more precise definition, but also consisted of organizing and explaining how certain factors could prevent the individual from exercising control over his working environment. Notable factors included: (cf.,White,1972:37-40 and 92-94).

(1) Technological Constraints

White (1972:37) points out that the "nature and layout of the work process (technology) may be such that the worker has very little control over the pace and organization of his work".

Within the same plant, technological constraints may vary. The assembly line worker performs a predetermined task in a specified period of time, but the maintenance man, relatively free from technological constraints, organizes and establishes his own work routine.

(2) Environmental Constraints

Certain jobs require that an individual maintain a particular location during working hours. In a continuous-flow milling operation, for example, some workers are required to immediately intervene when changes in feed or density levels occur. As a result, they cannot leave their instrument boards. Certain workers facing the possibility of radioactive or chemical exposure are restricted to particular areas in a plant for fear of the possible contamination of others.

White (1972:38) suggests that environmental constraints are closely linked to the technology of an organization.

(3) Personal Constraints

Some individuals may lack the necessary skills, training, or experience to be able to depart from a set way of doing a job. In such instances, the exercise of personal discretion becomes highly unlikely for no alternative procedures present themselves to the worker.

Disabilities of health, mental and/or physical, may, in a similar manner, also prevent the exercise of autonomy.

In many instances, an employee in order to maximize the amount of freedom he is given on a job, must convince or demonstrate to his employer or supervisor that he is interested, competent and possessed of a sense of responsibility and dedication. In situations such as this, an employee's personality characteristics and/or level of motivation may facilitate or hinder his demonstration of the appropriate personal qualities.

(4) Supervisory Constraints

An individual may work for a man who demands that tasks be performed in a manner predetermined by him and allows those working for him little or no say as to how things should be done. Often, such a supervisor may even attempt to exert control over the morning, midday and afternoon breaks of his men. Obviously, individuals are denied a great deal of freedom under such a supervisor.

Another supervisor, in the same plant may allow his men a great deal of latitude in determing their method and hours of work. Kazulak (1977:6-7) provides an illustration of the effects of different supervisory styles on satisfaction and performance amongst underground uranium miners. Although an impressionistic account, he maintains that allowing individuals to exercise personal responsibility results in increased satisfaction and productivity.

White (1972:20) refers to the two predominate styles of supervision as (1) initiation of structure and (2) consideration. He views a consideration style as akin to participative leadership and maintains that a participatory style, "should facilitate greater worker autonomy" (1972:39).

(5) Group Constraints

Numerous researchers (Roy,1954; Roy,1960; Watson, 1972; Haas,1975; Rinehart,1975 and Kazulak,1977) have pointed out that the group an individual works with has certain expectations about his behavior. These expectations pertain not only to his productivity on the job, but also may involve appropriate social behavior on and off-the-job. The acceptance of this normative structure may severely curtail the amount of independence or freedom enjoyed by the individual.

(6) Peer Constraints

White (1972:39) notes that "powerful, dominant or popular individuals (and/or combinations of these three)" may affect an individual's autonomy in much the same manner as was noted under group constraints.

Consideration of all six factors involved in autonomy represents a problem of conceptualization beyond the intended scope of this study. Their existence is noted, but emphasis will be placed on the social aspects of autonomy as represented by supervisory, group and peer constraints. These three factors will be considered not only when the individual is performing his work, but during slack periods as well. White (1972:41) refers to the former as work-task autonomy and the latter as non-work-task autonomy.

The actual measures of work-task and non-work-task autonomy will be presented in the next chapter and attention will now be focussed upon clarifying the meaning of another important component of the model.

Group Cohesiveness

Cartwright and Zander (1960:74) define group cohesiveness as "the resultant of all forces acting on all members to remain in the group". Such a definition has persisted through two editions of their book in spite of several rather devasting critiques. Albert (1953:233) provides the crux of these critiques by stating: "As it stands, cohesiveness is too general to explain anything in particular and so general as to describe anything one may wish to designate". Gross and Martin (1952:546-547) point out that several studies, notably the one done by Festinger, Schacter and Back that adopt the Cartwright and Zander definition, become "logically deficient because they do not measure the dimensions of cohesiveness as nominally defined".

Seashore (1954:11) considers the work done by Cartwright and Zander and implicitly maintains that their notion of group cohesiveness must be taken in the context of Lewinian field theory. To some extent, it is a formal definition. Such formal definitions though logically quite correct at an abstract level, become logically inconsistent when attempts are made to adopt them in empirical research.

Cartwright and Zander (1960:72) distinguish three different meanings of the term "group cohesiveness". These are: "(a) attraction to the group, including resistance to leaving it (b) motivation of the members to participate in group activities (c) co-ordination of the efforts of members". Seashore (1954:10) maintains that Cartwright and Zander "hold that these categories of meaning are conceptually different, susceptible to independent measurement and should be kept separate for reasons of conceptual clarity". Although these three dimensions of 'groupness' appear to be empirically related to one another, Cartwright and Zander propose that "the term 'cohesiveness' be used only in reference to the attraction of members to the group" (Seashore,1954:11). Thus, group cohesiveness can be defined as "the attraction to the group, including resistance to leaving it" (Cartwright and Zander,1960:72).

This will be the definition of group cohesiveness adopted in this study. As with other model components, the actual operationalization of the concept will be demonstrated in the next chapter and another model component, off-the-job contact, now becomes the object of scrutiny.

Off-The-Job Contact

In Chapter 1 considerable attention was paid to Robert Blauner's work with occupational communities. It was his work that prompted the definition of off-the-job contact as the frequency with which co-workers interact with each other when they are not at work.

Analytically, four factors emerge as important considerations for the existence of an occupational community. These are:

(1) Workers talk to each other about their jobs when they are not working.

(2) Workers participate with each other in a variety of non-work activities.

(3) Workers help each other out in times of personal trouble.

(4) The occupation becomes the reference group

and its normative structure guides worker's conduct.

The first three factors appear to be relatively easy to measure in comparison to the fourth. It may be possible to infer the existence of the fourth based on the first three, but no direct evidence can be easily mustered. For this reason, off-the-job contact will be quantitatively defined in terms of interaction. Three forms of interaction will be examined - talking, participating and helping.

To date, the analytical properties of danger, autonomy, group cohesiveness, and off-the-job contact have been investigated and definitions proposed. In the next segment, one of the major dependent variables in the model will be examined.

Job Satisfaction

It appears relatively simple, at first glance, to define job satisfaction. The extent to which workers are satisfied with their jobs appear to be a self evident definition, but difficulties arise when one considers the terms job and satisfaction. Is a job simply what one does, or does it involve many more dimensions which make up the total field in which work is carried out?

Using factor analysis, Baehr and Renek (1958:176) isolated certain dimensions of worker morale or satisfaction. These were:

> "Factor A (Organization and Management). Includes feelings of a sense of commitment to the organization, general sentiments on the organization and management as a whole, as reflected in worker security.
>
> Factor B (Immediate Supervision). Includes sentiments about the nature of one's immediate supervisor(s).
>
> Factor C (Material Rewards). Includes sentiments about the pay and benefit structure of the organization as it effects the worker.
>
> Factor D (Fellow Employees). Includes sentiments about the nature of interpersonal relations on the job.
>
> Factor E (Job Satisfaction). This factor represents the intrinsic satisfactions associated with actually doing the job and with the belief that the job is worthwhile and affords opportunities for personal growth and development."

If Baehr and Renek's results are considered, it appears that an understanding of job satisfaction must involve awareness of the multi-faceted nature of the concept.

Satisfaction may be a relative thing. Schneider and Snyder (1975:319) proclaim that "job satisfaction consists of filtered and processed perceptions, perceptions filtered through the individual's system of norms, values, expectations and so forth".

After careful consideration, White (1972:41) offers the most suitable definition of job satisfaction by defining it as:

> "The psychological state of the worker with regard to his assessment of the adequacy and acceptability, relative to his personal value standards, of his work-task activities, his employer's policies and their execution, his work peers, and more generally his role within the organization".

This will be the definition of job satisfaction adopted in this study, but certain problems may develop with attempts to directly ask respondents about their level of satisfaction. Individuals may not be content, but yet pronounce that they are satisfied, either not knowing what the interviewer means by "satisfied" or not caring, either through distrust or apathy, to answer how they really feel. Given these possibilities, it appears that an indirect measure of job satisfaction is called for.

The Cornell Job Description Index, or JDI for short, is the most widely used indirect measure of job satisfaction in existence today and will constitute the measure of job satisfaction employed in this study. Further explanation of what is entailed in the JDI will be presented in the following chapter. Attention will now be focussed on the second dependent variable in the model.

Effectiveness

Throughout most of Chapter 1, as well as in this chapter, productivity and effectiveness have been used interchangeably. There is, however, a noteworthy difference. White (1972:43) suggests that the concept of effectiveness is a better means of evaluating an employee's performance than productivity. He notes:

> "While productivity is a criteria widely employed in the evaluation of employees, it is suggested here that productivity alone may actually only be a single dimension of a broader criteria used by employers in evaluating workers".

White (1972:43) maintains that quantity and quality of work produced are important considerations of a worker's performance. Equally important is the consistency with which quantity and quality are maintained. The final consideration involves "the dependability of the worker's personal habits in such matters as absenteeism and tardiness".

Given these considerations, it appears that effectiveness is an extension and clarification of the notion of productivity. If such is the case, then the research results noted for productivity should be somewhat comparable if effectiveness is substituted for productivity. Unfortunately, this is obviously an assumption that, due to the fairly recent formulation of the concept of effectiveness, has not been subjected to extensive empirical investigation. The use of effectiveness as a major dependent variable in this study may help alleviate this shortcoming.

Effectiveness is a multi-dimensional concept and, as such, a single definition presents a problem. White (1972:44) suggests that the previously mentioned factors be viewed as an index of effectiveness, and he provides a summary contained in Figure 2-2 below.

FIGURE 2-2

SUMMARY OF SUGGESTED CONSIDERATIONS
IN WORKER EFFECTIVENESS RATINGS

Acceptability	(i)	production levels
	(ii)	work-quality levels
Reliability	(i)	production levels
	(ii)	work quality levels
	(iii)	personal habits - (absenteeism and tardiness)

Given these factors it may be possible to def[illegible]e effectiveness in general terms as the acceptability and reliability of a worker's performance. Unfortunately, without further explanation of what the terms acceptability and reliability refer to, the actual meaning of effectiveness may be subject to diverse interpretations. Therefore, a definition of effectiveness must also make mention of what acceptability and reliability refer to, so that a complete understanding of the concept is possible. Effectiveness, therefore, becomes defined as the acceptability and reliability of a worker's performance - acceptability, in terms of quantity and quality of work produced; and reliability, in terms of the consistency with which quantity and quality are maintained; as well as dependability of personal habits involving such concerns as absenteeism and tardiness.

To date, all model components have been subject to intense scrutiny and a number of potential problems identified, and solutions offered. Although many of the problems associated with specific model components have been dealt with, certain concerns of a more general nature remain to be considered. These additional concerns will be examined in the next section.

Theoretical and Practical Problems

Scope

Thus far, exclusive emphasis has been placed on underground miners. Factors important in ability to cope with danger have been identified, but unless a comparison is made, it may never be discovered whether there is any real difference between those who work in a dangerous environment and those who do not.

A reappraisal of Tables 1-1 and 1-2, reveals that those employed in reduction plant operations have far fewer accidents and fatalities than do underground miners. Those employed in reduction plant operations are known as mill operators. In order to assure variability in the measures of danger employed in this study, the sample of underground miners will be supplemented by a sample of mill operators at the same site.

Although concentration has been focussed on the notion of coping, one further point is worthy of consideration.

Coping

Most of the factors involved in coping have been dealt with, but Mechanic (1974:34) voices a concern about the emphasis of most studies dealing with stress and adaptation stating:

> "In large part, the literature on stress and coping has aided the myth that adaptation is dependent on the ability of individuals to develop personal mastery over their environment. Indeed, most psychological studies of adaptation are studies of individuals and not of groups...Increasingly, it is clear that major stresses on modern man are not amenable to individual solutions, but depend on highly organized co-operative efforts..."

With Mechanic's concern in mind, attempts will be made to determine the importance of the group as a vehicle for coping. Part of this can be accomplished by considering the importance of group cohesiveness as a means of coping with danger, but if possible, an attempt will be made to place individuals in their respective work groups, and then compare the aggregated response of one group to that of another.

Summary

In this chapter, a model guiding research into how underground miners cope with danger was presented. Discussion centered on the assumptions underlying the formation of the model and the empirical support justifying it.

A series of hypotheses were outlined, but due to the potential difficulties involved with the correspondence between the perceptual and objective aspects of danger - not to mention the correspondence between different types of danger in their perceptual and objective manifestations; it was maintained that some of the work to be done in this study must, of necessity, be exploratory or descriptive in nature.

Specific model components were analyzed and defined. Although no actual operationalization of the components took place, potential problems were identified and solutions proposed.

Finally, deliberation with concerns at a more general level, brought forth two concrete recommendations. First, it was decided that in order to assure variability in the measures of danger, mill operators, who work in relatively safe environments, were to be sampled at the same site as underground miners. Second, it was decided that emphasis should be placed on discovering the importance of the group as a means of coping with danger - going even so far, if possible, to comparing groups with each other.

In the next chapter, several topics will be featured. These topics include: (1) The characteristics of the respondent's community and organizational environment (2) The sampling procedures adopted in this study (3) The operationalization of the model components. Also included will be a discussion and clarification of some important perceptual and objective factors associated with danger.

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Chapter 3

The Sample and Methodology

Introduction

This chapter focusses on the characteristics of the respondent's community and organizational environment, the sampling procedures employed, and the operationalization of the concepts outlined in Chapter 2.

Organizational and Community Characteristics

The Setting

In Chapter 2, it was decided that in order to properly assess the effectiveness of the coping mechanisms outlined, it would be necessary to have variability in the measures of danger employed. To assure variability in the measures of danger, it would be necessary to have, in the same sample, those working in a dangerous environment as well as those working in a relatively safe environment. A reappraisal of material from Ham's (1976) report, suggested that mill operators, in comparison to underground miners, worked in a relatively safe environment and the inclusion of them in this study might assure the variability required in the measures of danger. Of course, variability in the measures of danger might be assured by including mill operators in the sampling frame, but additional problems present themselves if miners and mill operators do not live in the same community or work for the same company. Different responses under conditions of high and low danger might be accounted for, not by the difference in amount of danger present, but by differences in community life or organizational policy.

Fortunately, a locality does exist where miners and mill operators live in the same community and work for the same company. It is a mining town set in a relatively isolated sector of Northern Ontario. There are two mining companies operating in the town and virtually no secondary industry exists. Most of the people employed in the area work for one of the mines. For purposes of logistics and to assure variability in the measures of danger utilized, selected miners and mill operators, along with their respective supervisors, all of whom are employed by the same mine, were asked for their co-operation.

Although a brief glimpse of the community has been provided, the uninitiated reader may not be aware of the differences between miners and mill operators. These differences will be the subject of the next segment.

Work Characteristics of Miners and Mill Operators

Following a format originated by Trist and Bamforth (1951), but modified to meet the changes in mining practices and differences between coal and uranium mining, a schemata was developed to show the method of payment, work task requirements, status, and group structure for both miners and mill operators (see Appendices 2 through 7). Underground mining is a resource extraction process, whereas milling closely resembles the continuous flow process found in many chemical plants. The tasks performed, as can be seen in appendices 2 through 7, are very different.

White (1972:69-70) notes that "production organizations can conveniently be subdivided into manufacturing and resource organizations". Of these:

> "...manufacturing organizations are those concerned with the conversion of raw materials into an output of a product of varying completeness; in contrast with resource organizations which have a central interest in the supply of raw materials whether they be oil, natural gas, coal, lumber, fish or whatever..."

In a sense, both manufacturing and resource type organizations are represented in our sample. The miner supplies raw material in the form of broken rock and the mill operator is involved in a process that transforms the broken rock into a yellow cake powder.

To date, certain community and organizational characteristics have been considered. In the next section, the actual sampling procedures adopted in this study, will be examined.

The Sample

Preliminary Contacts

A letter was sent by the Chairman of the Sociology Department at the University of Alberta, on behalf of the researcher to the Vice President of Technical Operations. The researcher was introduced and permission for the study to be undertaken on the mine and mill sites was requested. After a favourable response, the researcher met with the Director of Industrial Relations and his assistant. A time frame was established and meetings arranged with senior mine and mill supervisors. The researcher also contacted the President of the local union and, after explaining the nature of the study and offering to provide the results to both the union and company, asked for his permission to proceed. The President assured the researcher of his co-operation and offered to help in any way he could.

Selection of the Sample

Any selection of a sample for an empirical study, is governed by the constraints imposed by the laws of probability, as well as the particular interests or concerns of the researcher. In this study, two fundamental concerns preoccupied the researcher. First, he wanted to assure variability in the measures of danger utilized so that a sufficient number of those working in a relatively safe environment could be compared to those working in a dangerous environment. Second, in order to ascertain the importance of the group as a means of coping with danger, he wanted, if possible, to adopt the group as the basic unit of analysis.

Given these concerns, certain important criteria emerged to guide the selection of the sample. These criteria included: (1) the sample must be random (2) the population must be comprised of face-to-face interacting groups, and, (3) the wide variety of occupational subclassifications in the mine and mill must be proportionately represented.

The Payroll Lists supplied by the company contained the job classification of each man along with his respective supervisor and, at the site, there were four hundred miners and sixty-eight mill operators. Certain conclusions followed from this information. First, in order to assure variability in the measures of danger; to assure a proportionate representation of all subclassifications; and to protect against the possibility of a number of non-responses, all groups of mill operators would have to be sampled. Second, to assure a proportionate representation of all subclassifications and to protect against the possibility of refusals, it was decided to sample one-half of the miners. Third, although it was mentioned in the second conclusion that one-half of the miners would be sampled, this, in actuality, is not quite correct. Since the Payroll Lists also contained the names of supervisors, it appeared to be more appropriate to sample one-half of the supervisors and then match the crew to the supervisor. Shift groups underground, unlike the mill, varied considerably in size and, therefore, precisely half of the miners could not be expected to fall into the sampling frame. The fact that underground shift groups varied in size also became of consideration in the decision to sample half of the shift groups underground for, in order to increase the chances of having shift groups of all sizes represented as well as allowing comparisons between groups of different sizes to be made, a large sampling frame appeared called for.

Questionnaire Administration

The researcher visited each individual work place in the concentrator and the grinding plant, explaining the nature of the study and assured the respondents that no one but him would see their answers. To facilitate this end, brown manila envelopes were given to each man and the researcher personally picked up the questionnaires which had been sealed inside. The same procedure was followed with mill supervisors when they were asked to fill out effectiveness ratings on the members of their shifts. The researcher met each supervisor in his office, explained the study, assured confidentiality, and picked up the sealed envelopes containing the supervisor's assessment of the members of his crew. All these responses from the mill operators and their supervisors were kept under lock and key until the researcher returned to Edmonton.[1]

The situation with the underground miner sample presented greater difficulties. It was expected that questionnaires could be filled out by the selected shift groups during their safety meetings. Unfortunately a refusal by the Acting Mine Manager to grant any more than five minutes to the researcher during the underground safety meeting proved to be an insurmountable obstacle in the adoption of this strategy.[2]

Using the sample previously selected, the researcher ascertained the addresses of each member (including the Supervisor) of the various shift groups. This information was available through personnel listings, telephone directories and dormitory residence listings. The researcher then visited each address personally and explained the nature of his study, assured anonymity and confidentiality and dropped off the appropriate questionnaire in an unsealed, stamped, self addressed envelope.

These personal visits were supplemented with a note of thanks printed in the local newspaper on two consecutive weeks after the researcher left the community.

Response Rates and Follow-Up

One month after the researcher returned to Edmonton, 55 responses had been received from miners. The follow-up letter addressed to non-respondents (see Appendix 8) yielded an additional 15 responses increasing the sample of miners by 21.4 percent to 17.5 percent of the total miner population and 37.8 percent of the sampling frame (See Table 3-1).

As is readily apparent from Table 3-1, 70.6% of the total mill operator population responded. Taken

Table 3-1

Summary of Sampling Information

Population	MINERS	MILL OPERATORS	TOTAL
a) At Site	400	68	468
b) In Sampling Frame	185	68	253
c) Actual Respondents	70	48	118
Response Rates			
a) As a percentage of Site Population	17.5%	70.6%	25.2%
b) As a percentage of the Sampling Frame	37.8%	70.6%	46.7%

together, the miner and mill operator response rate represents 25.2% of the total population and 46.7% of those in the sampling frame.

Only two supervisors in the mill and one underground supervisor refused to fill out the Supervisory Rating Scale. A response rate of 85 percent (17 out of 20) amongst supervisors, although excellent, still left data incomplete on 22 respondents. Follow up letters (see also Appendix 8) did not result in any further responses.

One of the original intentions of this study was to adopt the group as the basic unit of analysis, but unfortunately with a response rate of only 37.8 percent for miners, such a strategy becomes untenable. All members of the various groups are not represented and, without them, any analysis undertaken with the group as the basic unit of analysis would be similar to trying to describe the physical appearance of a human being without making any reference, whatsoever, to the existence of arms and legs.

The response rate of 37.8 percent for miners represents a common reply to mailed questionnaires (cf., White,1972). The major difficulty with such a response, outside of now having to adopt the individual rather than the group as the basic unit of analysis, involves determining the representativeness of the sample. If the sample does not adequately reflect the characteristics of the population, then it may be impossible to make statements of a general nature about the population as a whole. The representativeness of this sample will be discussed in the next section.

Sample Characteristics

In this major section, consideration will be given to selected demographic and occupational characteristics of those in the sample and, where possible, of those in the general population. A comparison of this nature, may provide an indication of the representativeness of the sample. Following this, the actual operationalization of the various model components will be demonstrated. In the case involving the measures of danger, relationships between these various measures will be examined and the response patterns of various occupational groupings and subgroupings to these measures will be scrutinized. In the case of other model components, all of which involve itemized indices, the relationships between the items themselves, and with the total index will be investigated. Such considerations will give some idea of the reliability and validity of the measures employed as well as, in the case of danger, bring to light any peculiarities in the response patterns of the various occupational groupings or subgroupings.

Demographic and Occupational Characteristics

Although not reported in Table 3-2, the age of respondents ranged from eighteen to sixty-three, the number of years with the company varied from less than one year to twenty years and the number of years on a particular job ranged from less than one to twenty-seven. Fluctuations of this nature, suggest that all segments of the population are represented.

Table 3-2 offers an interesting comparison between miners and mill operators. Miners, in general, are older, have been on the job and with the company longer and have less education than mill operators. The greater proportion of Quebecois are employed underground. These factors, based on the researcher's personal experience, were to be expected. If these patterns had not been observed, serious doubts about the representative nature of the sample would have arisen.

Table 3-3 demonstrates that all the major job subclassifications are proportionately represented in the sample. Although, by no means an exact replication of the proportions in the population, these figures

Table 3-2

Selected Detailed Characteristics of Respondents

	TOTAL SAMPLE	MINERS	MILL OPERATORS
Age	$\bar{x}$ - 32.36 yrs. SD - 11.25	$\bar{x}$ - 35.13 SD - 11.47	$\bar{x}$ - 28.23 SD - 9.63
Job Seniority	$\bar{x}$ - 4.36 yrs. SD - 5.71	$\bar{x}$ - 5.17 SD - 6.34	$\bar{x}$ - 3.17 SD - 4.45
Company Seniority	$\bar{x}$ - 5.78 yrs. SD - 5.86	$\bar{x}$ - 7.36 SD - 6.40	$\bar{x}$ - 3.48 SD - 4.02

		TOTAL SAMPLE	MINERS	MILL OPERATORS
Education Completed	Some public school -	21.6% (25)	29.4% (20)	10.4% (5)
	Graduated public school -	9.5% (11)	10.3% (7)	8.3% (4)
	Some high school -	38.8% (45)	33.8% (23)	45.8% (22)
	Graduated high school -	23.3% (27)	20.6% (14)	27.1% (13)
	Some university -	4.3% (5)	1.5% (1)	8.3% (4)
	Graduated university -	2.6% (3)	4.4% (3)	

		TOTAL SAMPLE	MINERS	MILL OPERATORS
Reported Ethnicity (Major Categories)	Canadian -	54.2% (64)	47.1% (33)	64.6% (31)
	Quebecois -	16.9% (20)	22.9% (16)	8.3% (4)
	Other -	29.9% (34)	30.0% (21)	28.1% (14)

Table 3-3

A Comparison of Sample Job Classifications with Population Job Classifications

SUBCLASSIFICATION - MINE	PERCENTAGE IN TOTAL POPULATION	PERCENTAGE IN SAMPLE
Mobile Equipment Operators	21.00% (84)	15.7% (11)
Rock Breaker Operators	2.00% (8)	1.4% (1)
Servicemen (includes servicmen 1 & 2, Leachers, Beltmen and Labourers)	26.75%(107)	25.7% (18)
Jumbo Drillers	18.00% (72)	20.0% (14)
Hi Lo Operators	3.25% (13)	4.3% (3)
Loaders	4.00% (16)	4.3% (3)
Drift	6.00% (24)	7.1% (5)
Longhole	3.50% (14)	4.3% (3)
Stope	12.00% (48)	12.9% (9)
Diamond Drillers	3.50% (14)	4.3% (3)
TOTALS	100.00% 400	100.0% 70

MAJOR JOB CLASSIFICATIONS - MILL	% IN TOTAL POPULATION	PERCENTAGE IN SAMPLE
A Operators	17.6% (12)	25.1% (12)
B Operators	61.7% (42)	56.3% (27)
Labourers	20.6% (14)	18.8% (9)
TOTALS	99.9% 68	100.2% 48

reveal that no glaring sampling bias exists.

The focus of inquiry now shifts from the question of sample representativeness to the operationalization of the model components. The control condition of danger is a crucial component, and, as such, becomes the first component to receive attention.

Danger

Danger was previously defined as a "condition of real or perceived threat to life or limb". Type I Danger referred to the possibilities of accidents and Type II Danger to the possibilities of contacting occupational diseases such as silicosis and lung cancer.

A respondent's perception of Type I Danger was ascertained through his responses to two questions. The first question asked: "How often do you consider your job to be dangerous?" The choice of answers on a five point Likert scale varied from "a great deal" to "none". The second question asked" "Compared to other jobs outside the mine, what do you consider your chances are of having an accident?" On a five point Likert scale, the available answers ranged from "a good chance" to "no chance". These two items were significantly associated (see Table 3-4) suggesting that they were both tapping the same dimension of danger.

Table 3-4

Crosstabulation of Two Indicators of Type I Danger

how often do you consider your job to be dangerous? \ chances of accidents	No chance	Very little chance	Some chance	A fairly good chance	A good chance
None	2	5	5	0	0
A little	0	8	12	1	1
Some	1	4	23	2	5
Quite a bit	1	0	9	7	3
A great deal	0	2	8	6	13

n = 118

Tau C = .43163

sig = .0000

In order to ascertain a more objective measure of Type I Danger, supervisors were asked the following question: "Considering where other members of your shift work, what are the physical conditions faced by this man in comparison?" Available responses to this item, varied on a five point Likert scale from "much better" to "much poorer". Those familiar with underground mining will easily recognize that asking about physical conditions is tantamount to asking: "How dangerous is the work?" For, poor physical conditions such as steep inclines, loose rock, wet footing, obscured vision, and the like, are inherently dangerous, and the opportunities for accidents are greatly increased.

The supervisor's assessment of the danger faced by his men was significantly correlated with both measures of Type I Danger (see Table 3-5 and Table 3-6). These results suggest that objective and subjective assessments of Type I Danger are comparable or, at least, the working man and his supervisor generally share a common perception of how dangerous conditions are. These results also suggest that asking about the physical conditions faced by employees does, in some respects, tap the same dimensions as the other indicators of Type I Danger and, by so doing, justifies the position that asking about physical conditions is equivalent to asking

Table 3-5

Crosstabulation of Supervisor's Rating of Danger
with Respondent's Perception of his Job as Dangerous

Super-visor's Rating of Danger / Dangerous Job	None	A little	Some	Quite bit	A great deal
Much better	5	4	0	1	2
Better	2	7	9	3	6
About the same	1	9	13	5	6
Poorer	0	1	2	7	9
Much poorer	0	0	0	1	3

n = 96

Tau C = .36051 sig = .0000

Table 3-6

Crosstabulation of Supervisor's Rating of Danger with Respondent's Perception of his Chances of Accident

Supervisor's Rating of Danger \ Chances of Accident	No chance	Very little chance	Some chance	A fairly good chance	A good chance
Much better	2	2	7	0	1
Better	0	6	13	2	6
About the same	2	6	17	6	3
Poorer	0	0	9	6	4
Much poorer	0	0	1	0	3

n = 96

Tau C = .23058 sig = .0027

about Type I Danger.

In order to discover how subjects felt about the possibilities of contracting lung cancer and silicosis, the following question was used as an indicator of Type II Danger: "Thinking about your own job and the people you have known, how do you feel about the following statement? 'Reports about the possibilities of getting lung cancer and silicosis are greatly exaggerated.' " Available responses ranged, on a five point Likert scale, from "strongly agree" to "strongly disagree".

Although this item correlated significantly with the perception of the chances of having an accident (Tau C = .1662 significant at the .01 level), correlations were weak and insignificant when cross tabulated with the supervisor's rating of danger and the respondent's consideration of his job as dangerous (see Table 3-7 and Table 3-8). These findings suggest that the measure of Type II Danger is tapping dimensions other than those covered by some of the indicators of Type I Danger. This, of course, would suggest that Type I and Type II Danger are not equivalent.

An examination of Table 3-9, reveals that miners, in comparison to mill operators, consider their jobs to be more dangerous and feel their chances of having an accident are greater. However, when lung cancer and silicosis are considered, more mill operators than miners

Table 3-7

Crosstabulation of Supervisor's Rating of Danger with Respondent's Concern about Silicosis and Lung Cancer

Supervisor's Rating of Danger \ Lung Cancer and Silicosis	Strongly agree	Agree	Uncertain	Disagree	Strongly Disagree
Much better	1	5	3	0	3
Better	3	6	5	3	10
About the same	4	3	16	5	6
Poorer	1	5	4	3	6
Much poorer	0	0	1	1	2

n = 96

Tau C = .08464

sig = .2928

Table 3-8

Crosstabulation of Respondent's Consideration of his Job as Dangerous with his Concern about Silicosis and Lung Cancer

Lung Cancer and Silicosis \ How often do you consider your job to be dangerous ?	None	Very little chance	Some chance	A fairly good chance	A good chance
Strongly agree	0	2	3	2	3
Agree	5	2	5	3	6
Uncertain	5	11	8	3	7
Disagree	2	1	4	4	2
Strongly disagree	0	6	10	8	11

n = 118

Tau C = .10270 sig = .1605

Table 3-9

Respondent's Response Patterns to Questions of Danger by Occupational Group

TYPE I DANGER

1) How often do you consider your job to be dangerous?

	MINERS	N	MILL OPERATORS	N	TOTAL SAMPLE	N
NOT OFTEN	24.3%	17	35.4%	17	28.8%	34
SOMETIMES	22.8%	16	39.6%	19	29.7%	35
OFTEN	52.9%	37	25.0%	12	41.5%	49
	100.0%	70	100.0%	48	100.0%	118

2) Chances of your having an accident?

	MINERS	N	MILL OPERATORS	N	TOTAL SAMPLE	N
LITTLE CHANCE	18.6%	13	20.8%	10	19.5%	23
SOME CHANCE	47.1%	33	50.0%	24	48.3%	57
A GOOD CHANCE	34.3%	24	29.2%	14	32.2%	38
	100.0%	70	100.0%	48	100.0%	118

TYPE II DANGER

Reports about lung cancer and silicosis

	MINERS	N	MILL OPERATORS	N	TOTAL SAMPLE	N
EXAGGERATED	32.9%	23	20.9%	8	26.3%	31
UNCERTAIN	25.7%	18	24.1%	16	28.8%	34
NOT EXAGGERATED	41.4%	29	50.0%	24	44.9%	53
	100.0%	70	100.0%	48	100.0%	118

tend to believe that reports about these occupational diseases are not exaggerated.

This finding is particularly surprising in view of how lung cancer and silicosis are contracted and their prevalence amongst miners as opposed to mill operators. For example, material taken from The Report of the Royal Commission on the Health and Safety of Workers in Mines, reveals that exposure to ionizing radiation increases the possibilities of lung cancer two-fold (Ham,1976: 108-109). Although mill operators in the uranium industry are exposed to ionizing radiation, underground miners generally receive more exposure. In 1974, eight cases of work-related lung cancer were attributed to the uranium mines of Ontario.[3] All involved underground miners (Ham,1976:14).

Some confusion does exist with regard to the contraction of lung cancer. Ham (1976:109), notes that it is difficult to determine how much lung cancer is work related. Half of the workers employed in the uranium mines who have lung cancer, would have contracted it even without working in the mines. Confusion of this nature may be a factor in the consideration of reports about lung cancer being exaggerated.

However, confusion of this nature does not exist with regard to silicosis. It is accepted that silicosis is solely a work related occupational disease.

The likelihood of contracting the disease increases with cigarette smoking and exposure to radiation, but the disease only occurs amongst those working in places where tiny silica particles are able to enter the lungs (Ham,1976:11-15, 19-35).

In 1974, for example, The Worker's Compensation Board of Ontario charged twenty-one cases of silicosis to the uranium mines. All of these cases were underground miners, no mill operators were involved (Ham, 1976:14).

At least in 1974, no mill operators were reported to have contracted lung cancer or silicosis and their chances of doing so, based on the manner in which these diseases are contracted, appear to be slight in comparison to miners. When these factors are considered, it is difficult to understand why a greater proportion of mill operators do not consider the reports about lung cancer and silicosis to be exaggerated. On the other hand, it is difficult to understand why a greater proportion of miners, than mill operators, consider these reports to be exaggerated (see Table 3-9).

This becomes even more surprising when it is discovered that the uranium mines of Ontario in 1974 employed four percent of all the underground workers in Ontario and yet, were responsible for twenty-five percent of the reported cases of silicosis (Ham,1976:14).

Of these cases, only one was outside the study area (Ham,1976:26). Reasons for this can be found in the fact that the amount of free silica in the ore outside the study area varies from five to fifteen percent, but in the study area, the amount of free silica in the ore ranges from sixty to seventy percent (Ham,1976:26).

The differences in perception between miners and mill operators may be partially accounted for by the failure to separate lung cancer from silicosis in the question asked of the respondents[4]. Certain respondents may have emphasized the lung cancer or silicosis segments of the question when answering. Given the confusion surrounding lung cancer, those emphasizing this segment of the question may have felt reports about it were exaggerated. Those emphasizing the silicosis segment may have regarded reports about it to be accurate.

In addition, the differences in perception between miners and mill operators may be partially accounted for by the nature of the silicosis disease. Ham (1976:28) points out that one does not immediately contract silicosis. In the uranium mines, the average length of time from first exposure to free silica until disability is eighteen years. This lack of immediacy may impede careful consideration of the issue.

Closer examination of Table 3-9 reveals an interesting difference between miners and mill operators. Approximately fifty-three percent (52.9%) of the miners in our sample regard their jobs as often dangerous, but only about thirty-four percent (34.3%) feel that they, personally, have a good chance of an accident. In contrast, twenty-five percent of the mill operators in this study regard their jobs as often dangerous, but about twenty-nine percent (29.2%) feel that they have a good chance of having an accident.

Results of this nature recall the work done by Janis (1951:124) in noting that fear responses subsided in conditions of high and low objective danger, but remained constant during periods of moderate danger. Perhaps miners may be in a condition of high objective danger and mill operators in a condition of moderate objective danger. Of course, if this explanation was all inclusive, greater numbers of mill operators reporting a good chance of an accident would be expected.

What does appear to be happening with miners, is a realization of the environment as "dangerous, but, along with this realization, somewhat of a rejection of the personal consequences of work in that environment. The words of one of the researcher's former mining instructors are illustrative of this outlook:

> "If you're careful, do what you're supposed to and don't take chances ...nothing will happen to you."

In a perceptual sense, a consideration of the job as often dangerous but a feeling that one's personal chances of accident are not as great as the environment would dictate, may be indicative of success in coping with danger. Earlier, mention was made of the fact that a significant correlation existed between the question dealing with lung cancer and silicosis and the question dealing with personal chances of accident. Some miners may regard reports about silicosis and lung cancer to be exaggerated because they feel these diseases will not affect them - just as they regard their environment as dangerous, but do not feel they have a good chance of an accident.

Turning to mill operators, one of the questions that naturally arises concerns whether they will exhibit the same response patterns as miners if certain factors are controlled. Ham (1976:149) notes that the two most crucial variables in accidents, outside the environment itself, are age and experience. Those under thirty years of age or those who have five years or less experience on-the-job, have more accidents and fatalities, proportionately, than do those who are older or have more experience.

Table 3-10, illustrates the responses to danger

Table 3-10

Response Patterns to Questions of Danger Controlling for Occupational Group and Age

	TOTAL SAMPLE				MINERS				MILL OPERATORS			
RESPONSES	≤29 yrs.	N	≥30 yrs.	N	≤29 yrs.	N	≥30 yrs.	N	≤29 yrs.	N	≥30 yrs.	N
Item 1 How often do you consider your job to be dangerous?												
NOT OFTEN	26.3%	15	31.7%	19	14.8%	4	34.2%	13	36.7%	11	35.2%	6
SOMETIMES	35.1%	20	25.0%	15	29.6%	8	18.6%	8	40.0%	12	41.2%	7
OFTEN	38.6%	22	43.3%	26	56.2%	15	47.2%	22	23.3%	7	23.6%	4
	100.0%	57	100.0%	60	100.0%	27	100.0%	43	100.0%	30	100.0%	17
Item 2 Personal chances of accident												
LITTLE CHANCE	12.3%	7	26.7%	16		0	30.3%	13	23.7%	7	17.7%	3
SOME CHANCE	52.6%	30	45.0%	27	55.6%	15	41.9%	18	50.0%	15	52.9%	9
A GOOD CHANCE	35.1%	20	28.3%	17	44.4%	12	27.9%	12	26.7%	8	29.4%	5
	100.0%	57	100.0%	60	100.0%	27	100.1%	43	100.0%	30	100.0%	17
Item 3 Reports about Silicosis and Lung Cancer												
EXAGGERATED	22.8%	13	30.0%	18	33.3%	9	32.5%	14	13.3%	4	23.5%	4
UNCERTAIN	35.1%	20	23.3%	14	33.3%	9	20.9%	9	36.7%	11	29.4%	5
NOT EXAGGERATED	42.1%	24	46.7%	28	33.3%	9	46.6%	20	50.0%	15	48.1%	8
	100.0%	57	100.0%	60	99.9%	27	100.0%	43	100.0%	30	100.0%	17

controlling for occupational group and age. Table 3-11, illustrates the responses to danger controlling for occupational group and experience. An examination of the responses of mill operators in both tables reveals that mill operators with over five years experience follow the same pattern as miners. They see their jobs as dangerous, but fewer of them consider that they have a good chance of an accident. This pattern is reversed when age is considered. It would appear that experience may be an important consideration when success in coping with danger is examined.

A striking pattern is revealed for miners with more than five years experience. Not only is the relationship between a dangerous job and personal chances of injury accentuated, but a polarity of response occurs when lung cancer and silicosis are considered. Only about eleven percent (11.2%) are uncertain about the reports dealing with lung cancer and silicosis. The remainder are evenly divided between considering the reports to be exaggerated (44.4%) and considering the reports to be accurate (44.4%). These same response patterns are noted for miners with over five years experience in high and low risk situations[5] (see Table 3-12). When consideration is given to the fact that miners with over five years experience have a greater chance of contracting lung cancer and silicosis (Ham,

Table 3-11

Response Patterns to Questions of Danger
Controlling for Occupational Group and Job Experience

	TOTAL SAMPLE				MINERS				MILL OPERATORS			
RESPONSES	0-5 yrs.	N	>5 yrs.	N	0-5 yrs.	N	>5 yrs.	N	0-5 yrs.	N	>5 yrs.	N
Item 1 How often do you consider your job to be dangerous?												
NOT OFTEN	31.5%	29	19.2%	5	26.9%	14	16.7%	3	37.5%	15	25.0%	2
SOMETIMES	31.5%	29	23.1%	6	25.0%	13	16.7%	3	40.0%	16	37.5%	3
OFTEN	37.0%	34	57.7%	15	49.1%	25	66.7%	2	22.5%	9	37.5%	3
	100.0%	92	100.0%	26	100.0%	52	100.0%	8	100.0%	40	100.0%	8
Item 2 Personal chances of accident												
LITTLE CHANCE	16.3%	15	30.7%	8	17.3%	9	22.3%	4	15.0%	6	50.0%	4
SOME CHANCE	50.0%	46	42.3%	11	46.2%	24	50.0%	9	55.0%	22	25.0%	2
A GOOD CHANCE	33.7%	31	27.0%	7	36.5%	19	27.7%	5	30.0%	12	25.0%	2
	100.0%	92	100.0%	26	100.0%	52	100.0%	18	100.0%	40	100.0%	8
Item 3 Reports about silicosis and lung cancer												
EXAGGERATED	33.9%	22	34.6%	9	28.8%	15	44.4%	8	17.5%	7	12.5%	1
UNCERTAIN	30.4%	28	23.1%	6	30.8%	16	11.2%	2	30.0%	12	50.0%	4
NOT EXAGGERATED	35.7%	42	32.3%	11	40.4%	21	44.4%	8	52.5%	21	37.5%	3
	100.0%	92	100.0%	26	100.0%	52	100.0%	18	100.0%	40	100.0%	8

Table 3-12

Response Patterns to Questions of Danger Controlling for Risk Factors and Experience amongst Underground Miners

Responses	Experience				Total		Experience				Total	
	≤5 yrs.	N	>5 yrs.	N	High Risk	N	≤5 yrs.	N	>5 yrs.	N	Low Risk	N
	HIGH RISK						LOW RISK					
Item 1 How often do you consider your job to be dangerous?												
NOT OFTEN	22.2%	6	7.7%	1	17.5%	7	32.0%	8	40.0%	2	33.4%	10
SOMETIMES	29.6%	8	15.4%	2	25.0%	10	20.0%	5	20.0%	1	20.0%	6
OFTEN	48.2%	13	76.9%	10	57.5%	23	48.0%	12	40.0%	2	46.6%	14
	100.0%	27	100.0%	13	100.0%	40	100.0%	25	100.0%	5	100.0%	30
Item 2 Personal chances of accident												
LITTLE CHANCE	22.2%	6	7.7%	1	17.5%	7	12.0%	3	60.0%	3	20.0%	6
SOME CHANCE	33.3%	9	61.5%	8	42.5%	17	60.0%	15	20.0%	1	53.3%	16
A GOOD CHANCE	44.5%	12	30.8%	4	40.0%	16	28.0%	7	20.0%	1	26.7%	8
	100.0%	27	100.0%	13	100.0%	40	100.0%	25	100.0%	5	100.0%	30
Item 3 Reports about silicosis and lung cancer												
EXAGGERATED	25.9%	7	46.1%	6	37.5%	13	32.0%	8	40.0%	2	33.3%	10
UNCERTAIN	29.6%	8	7.7%	1	22.5%	9	32.0%	8	20.0%	1	30.0%	9
NOT EXAGGERATED	44.5%	12	46.1%	6	45.0%	18	36.0%	9	40.0%	2	36.7%	11
	100.0%	27	99.9%	13	100.0%	40	100.0%	25	100.0%	5	100.0%	30

(1976:149), it appears, based on the responses noted, that the reduction of uncertainty may be crucial for them.

Some miners may be treating lung cancer and silicosis in the same manner as they treat the possibilities of accident, while others may be objectively considering the facts or fatalistically accepting what they have no control over. Unfortunately, there is no way of ascertaining, with the instruments used in this study, how much knowledge the respondents actually have about lung cancer and silicosis. There is no doubt that the knowledge respondents have about a subject could greatly influence their perception of it.

Given the fact that the question asking about lung cancer and silicosis does not correlate with either the question considering the job as dangerous or the supervisor's rating of danger, much of the analysis dealing with danger in the following chapters will employ an index comprised of consideration of the job as dangerous along with personal chances of accident. Effort has been extended at this point in order to discover patterns of response that may give clues as to the perceptual processes occurring in consideration of danger. These patterns of response may reoccur in the actual analysis and evaluation of hypotheses. Before discarding the question dealing with silicosis and lung cancer, it was considered necessary to examine it in relation to the other indicators of danger.

Considerable attention has been devoted to the measures of danger utilized in this study. Interesting results, such as the potential importance of experience in coping with danger and the tendency for those in high risk situations to reduce uncertainty about occupational diseases, have been discovered, but other model components have been neglected. Autonomy has been a neglected dimension, and, in order to rectify this situation, it will become the next focus of inquiry.

Autonomy

In Chapter II, following White (1972:92), autonomy was defined as "the amount of discretion or personal freedom that a worker can exercise in his work role". In White's analysis, six factors emerged as important potential barriers to the individual's exercise of freedom. These were:

(1) Technological Constraints
(2) Environmental Constraints
(3) Personal Constraints
(4) Supervisory Constraints
(5) Group Constraints
(6) Peer Constraints

The first three factors were considered beyond the scope of this study and, as a result, emphasis was placed on the latter three factors. Considered important was the distinction drawn by White (1972:41) between the freedom enjoyed by the worker when performing his work tasks and the freedom enjoyed by the worker when not performing his work tasks. White referred to the former condition as work-tasks autonomy and the latter as non-work task autonomy.

White (1972:93) developed separate questions asking about supervisory, group and individual constraints not only for consideration when the individual was performing his work tasks, but for his non-work-task activities as well. A typical example is represented by the following: "In doing your job, how often would you say that the group you work with has certain ways that they like everyone in the group to do the work, and a certain pace at which they like everyone to work?" The respondent was given a choice of answers on a five point scale ranging from "always" to "never".

White (1972:94) combined all the items dealing with work-task autonomy into a single index. This procedure was also adopted in this study, and the results of item intercorrelations are presented in Table 3-13.[6] The individual items correlated significantly (.001) with the total index.

Table 3-13

Intercorrelations for Work-Task Autonomy Items

	1	2	3	4
1. Work-task, supervision		.11	.07	.53
2. Work-task, group			.27	.73
3. Work-task, individual				.68
4. Work-task, total				

Again following White (1972:94), individual items dealing with non-work-task autonomy were also combined into a single index as presented in Table 3-14. All correlations were significant at the .001 level or better.

Table 3-14

Intercorrelations for Non-Work-Task Autonomy Items

	1	2	3	4
1. Non-work-task, supervision		.58	.52	.84
2. Non-work-task, group			.67	.88
3. Non-work-task, individual				.83
4. Non-work-task, total				

The measures of work-task and non-work-task autonomy were joined together to form an index of total autonomy in the manner described by White (1972:95). The resulting correlation matrix is shown in Table 3-15.

All correlations were significant at the .01 level or better.

Table 3-15

Correlation Matrix for Total Autonomy Items

	1	2	3
1. Work-task autonomy		.18	.67
2. Non-work-task autonomy			.85
3. Total autonomy			

The use of three different indicators of autonomy, offers a great deal of flexibility and a potential for greater clarification of any existing relationships and, therefore, all three measures of autonomy will be employed in the analysis of the data to be undertaken for this study. Group cohesiveness is another important model component, and the operationalization of this concept becomes the subject matter of the next section.

Group Cohesiveness

Earlier, group cohesiveness was defined as "the attraction to the group, including resistance to leaving it" (Cartwright and Zander,1960:72). Analytically, two components are presented. These are:

(1) Attraction to the group.

(2) Resistance to leaving.

Attraction to the group was measured by asking the respondents the following question: "If you were to think of other work groups you have seen, how does _your_ work group compare with those in terms of how _close and tightly knit_ it is, and how the members _help each other out?_" The available responses on a five point scale ranged from "very poor" to "very good".

Resistance to leaving the group was measured by a question which asked: "If you had the chance to do the _same kind of work_, with the _same pay_, in _another work group_, how would you feel about changing?" On a five point scale, available choices ranged from "very glad to move" to "very unwilling to move".

These two items were combined into a single index. Table 3-16, represents intercorrelations between the items themselves and their relationship to the total index.

Table 3-16

Intercorrelations for Cohesiveness Items

	1	2	3
1. Attraction to group		.28	.75
2. Resistance to leaving			.85
3. Total Cohesiveness			

All correlations were significant at the .01 level or better, suggesting that "attraction to the group" and "resistance to leaving" are both tapping aspects of the same dimension.

One major independent variable cluster in the model has not, as yet, been considered. This is off-the-job contact. Its operationalization becomes the next focus of attention.

Off-The-Job Contact

Defined as "the frequency with which co-workers interact with each other when they are not at work", off-the-job contact represents, in its entirety, a potentially very complicated set of interactions. For purposes of this study, three forms of interaction will be examined. They are:

(1) Talking
(2) Participating in activities
(3) Helping behavior

Talking as a form of interaction, of and by itself, is not the sole concern of this study. What appears to be more important, in the light of Blauner's (1974) work, is the amount of time spent talking about the job with co-workers when not working. Accordingly, the following question was asked: "Off-the-job, when you meet someone from your shift, how often would you say you talked about the job?" On a five point scale the possible responses varied from "never" to "most of the time".

The formulation of activities that would be appropriate considerations in seeking to tap the extent of participation was influenced by the researcher's personal experience in the study area along with work done by Adams (1968). Seven different types of activities emerged. They were:

(1) Having a drink at the local hotel.

(2) Outdoor recreation such as fishing, hunting, camping, swimming, skiing, etc.

(3) Home recreation such as picnics, card playing, gardening, home repair, etc.

(4) Community activities such as dances, fund raising, banquets, walkathons, etc.

(5) Brief drop in visits for conversation.

(6) Watching or playing in commercial recreation activities such as basketball, baseball, football, soccer, hockey, volleyball, bowling, pool, billiards, curling, etc.

(7) Union meetings or activities.

Respondents were given, prior to the listing of activities, the following instructions:

> "Often, people who work together see each other off-the-job. Think of your co-workers. How often do you and some member or members of the group you work with, participate in the following activities? (Where many activities are listed under one heading, please consider all of them together, rather than separately, when making a reply)".

For each category of activity listed, the respondents were given six choices ranging from "never" to "more than once a week" and asked to check one response category for each activity. All seven activity groupings were combined into a single index of participation. Table 3-17 reveals the intercorrelations between the items and the correlation of each item with the total index. All of the items correlated in a highly significant manner (.001) with the total overall index of participation.

In the consideration of helping behaviour, the researcher was again influenced by his personal experience in the study area and the work done by Adams (1968). Three different forms of helping behaviour emerged. They were:

(1) Giving or receiving advice on a non-work related matter (eg. buying or selling a house or car, marital, children, etc.

(2) Giving or receiving financial aid in a time of

Table 3-17

Intercorrelations for Participation Items

	1.	2.	3.	4.	5.	6.	7.	8.
1. Drink at local hotel		.17	.17	.25	.33	.30	.07	.53
2. Outdoor recreation			.48	.31	.37	.35	.19	.66
3. Home recreation				.44	.43	.42	.22	.72
4. Community activities					.35	.30	.23	.59
5. Conversation						.39	.23	.70
6. Commercial recreation							.38	.71
7. Union activities								.45
8. Total participation								

need.

(3) Giving or receiving aid that is not directly financial such as babysitting, home repair or improvement, clothing, food, etc.

Respondents were given, prior to the listing of the three forms of helping behaviour, the following instructions:

> "Sometimes, things CAN go wrong and a fellow doesn't know where to turn to, or maybe it's just a matter of a couple of dollars until payday or checking out what you already know with someone else. Think of your co-workers. How often, in the following circumstances, have you given or received help from them?"

For each category of helping behaviour listed, the respondents were given six choices ranging from "never" to "more than once a week", and asked to check one response category for each form of helping behaviour. All three items were combined into a single index. Table 3-18 reveals the intercorrelations between the items and the correlation of each item with the total index. All of the correlations in this table were at least significant at the .001 level.

Table 3-18

Intercorrelations for Helping Behaviour

	1	2	3	4
1. Advice on a non-work matter		.41	.37	.81
2. Financial Aid			.48	.77
3. Other Aid - not financial				.76
4. Total helping behaviour				

To date, measures for the control condition of danger, as well as the independent variables of autonomy, group cohesiveness, and off-the-job contact have been presented. Measures for the major dependent variables in the model remain to be outlined. Job satisfaction is a major dependent variable and, in the next section, its operationalization will be demonstrated.

Job Satisfaction

In Chapter 2, following White (1972:41), job satisfaction was defined as "the psychological state of the worker with regard to his assessment of the adequacy and acceptability, relative to his personal value standards, of his work-tasks activities, his employer's policies and their execution, his work peers, and more generally his role within the organization".

One of the most widely used measures of job satisfaction today is known as the Cornell Job Description Index or JDI for short.[7] Vroom (1964:100) notes that "the Job Description Index, is without doubt the most carefully constructed measure of job satisfaction in existence today". It is a modified adjective checklist that indirectly seeks to measure satisfaction on five dimensions. These dimensions are work itself, pay, opportunities for promotions, co-workers, and supervision.[8] Smith, Kendall and Hulin (1969:73-76) have tested this measure for internal validity, reliability, and acquiescence and response set and found that the scale fares well.

Differential expectations between young and older workers, for example, can be controlled on each dimension by converting raw scores into a percentile ranking using the extensive norms available. Unfortunately, these norms were developed in the manufacturing industry and although, somewhat comparable, they may not adequately reflect the experience of miners. For this reason, this strategy will not be adopted.

Table 3-19 represents the intercorrelations found in this study. All items were significant at the .001 level or better, when correlated with the total index.

Table 3-19

Correlation Matrix for Job Satisfaction Scales

	1	2	3	4	5	6
1. Work		.21	.37	.38	.34	.73
2. Pay			.28	.36	.15	.52
3. Promotion				.45	.19	.64
4. Supervision					.23	.76
5. Fellow workers						.63
6. Total satisfaction						

These results suggest that the five different aspects measured by the JDI are important considerations, for our sample, in an overall measure of job satisfaction.

The remaining model component to be discussed is effectiveness. This will be done in the next section.

Effectiveness

White (1972:43-44), as was earlier noted, declared that along with the quality and quantity of work produced by an employee, the consistency with which quality and quantity were maintained was an important consideration in any evaluation of the effectiveness of performance. A man who was often absent or late would have difficulty in maintaining a consistent performance.

Analytically, two major distinctions emerged which White termed reliability and acceptability.

Reliability referred to the consistency of the worker in maintaining quality, quantity and an acceptable record of punctuality and attendance. Acceptability referred to the production of work judged to be satisfactory in terms of quality and quantity.

In order to gain this information, the immediate supervisor for each respondent was asked to answer five questions on a rating scale that attempted to assess an employees performance on each of these five dimensions.[9]

White (1972:98) combined the acceptability and reliability measures into single indices and also created a total effectiveness index by combining all five components into a single index. The latter strategy has been adopted in this study. The correlation matrix that emerges, adopting this strategy, is presented in Table 3-20.

Table 3-20

Correlation Matrix for Effectiveness Index

	1	2	3	4	5	6
1. reliability-quality		.56	.28	.48	.62	.82
2. reliability-quantity			.41	.79	.40	.85
3. reliability-personal				.38	.15	.58
4. acceptability-quality					.41	.79
5. acceptability-quantity						.70
6. effectiveness-total						

Referring to his correlation matrix, White (1972:98) notes that his correlations "tend to be generally high and all are significant". Such is also the case for the majority of the correlations demonstrated in Table 3-20.

Summary

Methodological concerns and procedures constitute the basic subject matter of this chapter. An examination of selected features of our respondents' community and organizational environment was undertaken in order to provide the reader with some idea of the social milieu surrounding our respondents as well as demonstrating, by a description of the homogeneity of the community and organizational environment, the great control of external factors afforded by the selection of this particular setting as a place to conduct the study.

The actual sampling procedures, producing a yield of forty-eight mill operators and seventy underground miners, were then outlined and the reason for the change from the group to the individual as the basic unit of analysis explained.

Additional sections described selected characteristics of the sample population and the measures employed as indicators of the major model components. Considerable attention was devoted to the measures of danger employed in this study. Analysis revealed that the measures of Type I and Type II Danger were not comparable. Due to the fact that the subjective measures of Type I Danger correlated with the more objective measure expressed through the supervisor's rating of the danger present, it was decided to concentrate on employing measures of Type I Danger, along with the supervisor's rating, in subsequent analysis.

Although this is the strategy to be adopted, interesting results did occur in an examination of the response patterns to the question dealing with Type II Danger. It did appear that experience was an important factor in coping with this type of danger and, for those in high risk situations, it also appeared that there was a pattern amongst respondents to reduce, at least in their own minds, the uncertainty of their position. Unfortunately, difficulties with regard to the measurement of Type II Danger and an inability to discover how knowledgeable respondents actually were about lung cancer and silicosis, prevented a definitive statement about the importance of experience and the reduction of uncertainty in coping with danger. Any future research conducted in this area might profit from greater specification in the indicators of Type II Danger, as well as employing more extensive controls in the analysis.

The next chapter focusses on the relationships between the major independent and dependent variables in the model. These relationships will be examined with, and without, controlling for danger.

Notes

1. Under normal conditions the mill operator responses, along with the Supervisor's Rating Scales would have been immediately coded and destroyed, but difficulties with the underground sample occupied most of the researcher's time.

2. The researcher did go underground to a safety meeting and explained to a selected shift group the nature of his study. He assured confidentiality and distributed questionnaires in brown manila envelopes. One response was received. Personal conversations with members of the shift group revealed that most of the miners threw the questionnaires away when they got to their work place because they did not have time to complete it and did not want a partially completed questionnaire around.

3. This figure represents the Workmen's Compensation Board of Ontario's allowance of disability. It may be an underestimation of actual work related lung cancer in the uranium mines.

4. Due to the extremely sensitive nature of the subject, it was decided not to antagonize the company especially when their cooperation was required.

5. Ham (1976:330-337) points out that those employed in stopes, raises or headings are exposed to the greatest amount of dust and radiation as well as experiencing the highest accident rate. Miners working in those areas form the high risk group. Other miners form the low risk group.

6. The item correlations dealing with non-work-task, work-task, and total autonomy in this study were compared to White's (1972) results. Although differences were observed, the results were comparable. The same procedure was adopted for item correlations involving job satisfaction and effectiveness. The

results were again comparable. Such results suggest highly acceptable reliability of measurement.

7. A cursory appraisal of three 1976 journals where many articles on job satisfaction appear, revealed that approximately eighty six percent (85.7%) of the articles in Organizational Behavior and Human Performance, fifty five percent (54.5%) of the articles in the Journal of Applied Psychology and fifty percent of the articles in Personnel Psychology employed the JDI. This usage far outstripped that of any other measure. The closest competitor to the JDI was the Minnesota Satisfaction with Employment Questionnaire (MSQ) with maximum usage recorded in Personnel Psychology. The major difficulty with the MSQ concerns its use of questions which ask directly about satisfaction. Recent work by the Alberta Bureau of Statistics in their 1977 report on the Quality of Life and earlier work by Kahn (O'Toole,1973:15) suggests that questions asking directly about satisfaction are not particularly sensitive. Most responses tend to fall in the moderately satisfied category. Closer examination of specifics within an area of investigation, using indirect measures is recommended.

8. These items can be viewed in the general questionnaire presented in Appendix 1.

9. See the Supervisory Rating Scale in Appendix 1.

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Chapter 4

The Structure of Relationships

Introduction

Chapter 4 is the first of three chapters dealing with the relationships between the independent and dependent variables in this study. Each of these three chapters represents a different step in the evaluation of the model outlined in Chapter 2.

For purposes of simplification, it could be said that Chapter 4 represents an in-depth attempt to discover and analyze the structure of relationships between the major independent and dependent variables that emerge under different conditions of danger. In Chapter 5, through correlational analysis, attempts will be made to further clarify these relationships by pointing out their relative strengths. In Chapter 6, through regression analysis, further clarification is offered by placing emphasis on the relative importance of certain independent variables as predictors of changes in the major dependent variables.

In keeping with the notion of a step-like analysis of the data, the reader can easily ascertain, especially with the previous references to the mode of data analysis to be employed in Chapters 5 and 6, that a progression from a simple method of data analysis to a more complex method will be followed. With this aim in mind, emphasis in Chapter 4 will be placed upon comparing the differences in the means and medians of job satisfaction and effectiveness when they are subjected to differences in levels and types of danger, autonomy, and group cohesiveness.

In Chapter 3, considerable effort was expended dealing with the various measures of danger. It was decided that a certain comparability existed between Type I Danger and the Supervisor's Rating of Danger. In this chapter, these two measures will be used primarily as a control condition so that, for example, the effect of autonomy and/or group cohesiveness upon job satisfaction and effectiveness can be ascertained under conditions of danger perceived not only by the respondents, but by their supervisors.

Before analysis of the form outlined can be undertaken, it becomes important to discover the effects of different measures and levels of danger upon job satisfaction and effectiveness. Without such a preliminary step, fluctuations in the means of job satisfaction and effectiveness may be attributed solely to the influence of danger, rather than the action of autonomy or group cohesiveness.

The Effect of Risk and Danger Upon Job Satisfaction and Effectiveness

In Table 4-1, it can be seen that in a condition of low Type I Danger (ie., the possibilities of accidents) the mean level of both job satisfaction and effectiveness is lower than in a condition of high danger. These relationships are by no means significant as the probability of the difference in means occurring by chance is close to 50 percent in the case of job satisfaction and over 62 percent in the case of effectiveness.

The same trend exists with Type II Danger (ie, the possibilities of contracting occupational diseases) although, the median for job satisfaction is higher in a condition of low danger than in a condition of high danger. It would appear, with a skew of this nature, that some very low satisfaction scores were recorded in this category forcing the mean downward, but not affecting the median. Again, it must be remembered that the differences in means and medians are in no way significant.

When the Supervisor's Rating of Danger is considered, a reversal is found in the case of job satisfaction. In a condition of low danger, the satisfaction score is higher than in a condition of high danger. This difference is

Table 4-1

The Effect of Risk and Three Measures of Danger Upon Job Satisfaction and Effectiveness

	JOB SATISFACTION			N	EFFECTIVENESS			N
	MEAN	SD	MEDIAN		MEAN	SD	MEDIAN	
Type I Danger (ie., possibilities of accidents)								
LOW	113.21	38.08	115.50	(42)	16.90	4.16	17.50	(48)
HIGH	118.37	31.56	123.75	(51)	17.29	3.76	17.50	(48)
T-TEST*		sig =	.485***			sig =	.626	
Type II Danger (ie., possibilities of contracting occupational diseases)								
LOW	95.00	34.27	122.50	(44)	16.95	4.20	17.13	(57)
HIGH	112.45	34.78	114.75	(49)	17.31	3.60	17.71	(39)
T-TEST		sig =	.292			sig =	.654	
Supervisor's Rating of Danger								
LOW	122.54	34.49	121.50	(28)	16.94	3.70	16.73	(39)
HIGH	120.71	31.70	124.83	(48)	17.19	4.15	17.69	(57)
T-TEST		sig =	.819			sig =	.763	
RISK (Ham's objective assessment, for underground miners, of the possibilities of both having an accident and contracting occupational diseases)								
LOW	118.04	39.75	124.50	(24)	16.17	4.32	15.88	(29)
HIGH	130.63	28.95	134.00	(32)	17.93	3.30	18.70	(40)
T-TEST		sig =	.197			sig =	.073**	

* All T-TESTS are two tailed unless otherwise stated

** Median Test significant at .05 level using Median Test outlined by Horowitz (1974: 402-404)

*** In this table, and throughout the remaining tables in this chapter, median tests were performed whenever the difference between medians exceeded the difference between means. Only significant results are noted however.

quite slight with a score of 122.54 recorded in low danger in comparison to a score of 120.71 recorded in high danger. The job satisfaction medians are reversed with 121.50 found in low danger and 124.83 found in high danger. In the case of effectiveness, a lower mean is found in low danger and a higher mean in high danger. The medians are reversed but the difference between them amounts to only .04. They are virtually identical.

In a situation of high and low risk (Ham's objective assessment, for underground miners, of the possibilities of both having an accident and contracting occupational diseases), greater differences are noted between the means and medians. Here, a mean job satisfaction score of 118.04 in low risk compares to a score of 130.63 in high risk. The differences become even more striking when the medians for effectiveness are compared. In the low risk situation the median for effectiveness is 15.88. In the high risk situation the median is 18.70. Using a Median Test outlined by Horowitz (1974:402-404), the difference between these medians is significant at the .05 level.

The results in the risk condition are not particularly surprising when it is remembered that many of those in a high risk situation have been working at their jobs for more than five years and are employed in stopes and headings.[1] Although the danger in these stopes and headings is great, all underground production is centered here and a productive employee has the opportunity for substantial financial rewards. Having worked at a job for over five years, the men are, in all probability, career miners who possess the necessary skills and temperament to be effective. It is therefore not surprising that their supervisors consider them to be highly effective.

The higher satisfaction scores of those in a high risk situation may be reflective of the fact that they are engaged in relatively more challenging work and receive greater financial rewards than do most of those in a low risk situation. Additionally, those in a high risk situation report greater levels of autonomy and group cohesiveness than do those in a low risk situation.[2] Although these relationships are not significant, they do give some credence to the idea that greater autonomy and cohesiveness may be factors in the greater job satisfaction of those in high risk situations. Another element that may be operative amongst those in a high risk situation is the satisfaction that can be derived from doing a job well. In the case of miners, doing a job well is tantamount to being effective, for the criterion of success involves the maintenance of a high standard of work over an extended period of time. Miners are paid on an incentive basis and most big bonus miners enjoy high prestige. This bonus can only be achieved if a consistently high standard of work is maintained. This researcher, when working as a miner, remembers the tremendous sense of satisfaction he derived when his day's work went well. All other irritations seemed to vanish and the sense of accomplishment was pervasive. Although, not a primary focus of this study, a significant relationship between job satisfaction and effectiveness was found for miners, but not for mill operators. This finding tends to support the experiential notions of this researcher.

Although dealing with high and low risk situations does appear to offer a potential for considerable insight into coping with danger, several factors mitigate against continued use of it as a control condition. First, risk situations can only be objectively determined for underground miners. Those working in the mill are not included and the potentially important variation in perceptions of danger might not be realized if this strategy is continued. Second, although a general propensity for risk can be ascertained, considerable variation in the possibilities of accident or injury may exist within a high risk condition. Some miners may be continually exposed to dangerous conditions while others may not. By using respondents' and supervisors' assessment of the danger present, greater control over individual variations in the amount of danger present may be possible. Third, the type of analysis proposed for this chapter involves the extensive use of control conditions and there are only forty miners in a high risk situation and thirty in a low risk situation. From a purely practical standpoint, certain created categories will have very few representatives and the results may be highly unstable. Fourth, a natural bias exists with the high risk group. Earlier, it was noted that those in the high risk group worked in areas where virtually all production was concentrated. Obviously, as a group, they are effective or they would not be working where they are. The higher satisfaction scores recorded by this group, no matter the reason, would seem to indicate that if a high level of job satisfaction is indicative of success in coping with danger that those in a high risk situation are coping quite well. One might even say that they have coped. If they indeed have coped, this may create an analytical problem for the mechanisms allowing them to cope may not be as salient once they have come to grips with the hazards in their working environment.

Making a summation of the results noted in Table 4-1, it would appear that a slight tendency exists for higher job satisfaction and effectiveness scores to be recorded under conditions of high rather than low danger. By concentrating on Type I Danger and the Supervisor's Rating of Danger, it could be safely said that differences in levels of danger are not reflected in significant differences in the level of either job satisfaction or effectiveness. Significant changes in the dependent variables must be accounted for by the action of other variables either by themselves, or under certain specified control conditions such as high or low danger.

In keeping with this fundamental idea, attention is now directed toward discovering if the major independent variables in this study affect job satisfaction and effectiveness without controlling for danger.

The Effect of Cohesiveness and Autonomy Upon Job Satisfaction and Effectiveness

Table 4-2 contains four major independent variables although three of these variables are measures of autonomy and the additional one is a measure of group cohesiveness.

With reference to Table 4-2 it can be seen that in a condition of low group cohesiveness both the mean and median scores for job satisfaction and effectiveness are significantly lower than in a condition of high group cohesiveness. This would suggest a natural relationship exists such that the higher the level of group cohesiveness, the higher the level of job satisfaction and effectiveness.

Table 4-2

The Effect of Cohesiveness and Three Measures of Autonomy
Upon Job Satisfaction and Effectiveness

	JOB SATISFACTION			N	EFFECTIVENESS			N
	MEAN	SD	MEDIAN		MEAN	SD	MEDIAN	
COHESIVENESS								
LOW	105.25	34.30	103.17	(52)	16.12	4.46	16.25	(49)
HIGH	129.73	30.07	133.07	(41)	18.17	3.07	18.50	(46)
T-TEST		sig =	.000			sig =	.010	
TOTAL AUTONOMY								
LOW	105.85	36.76	103.50	(40)	15.74	4.19	15.83	(42)
HIGH	123.74	30.98	124.25	(53)	18.20	3.44	18.42	(53)
T-TEST		sig =	.015			sig =	.003	
NON-WORK-TASK AUTONOMY								
LOW	114.47	36.20	120.00	(38)	16.46	4.15	16.33	(41)
HIGH	117.13	33.68	119.00	(55)	17.61	3.78	18.07	(54)
T-TEST		sig =	.722			sig =	.169	
WORK-TASK-AUTONOMY								
LOW	114.10	35.21	120.50	(48)	16.65	4.06	17.20	(49)
HIGH	118.11	34.13	119.00	(45)	17.61	3.85	18.00	(46)
T-TEST		sig =	.579			sig =	.242	

Results become somewhat more intriguing when the autonomy measures are considered. Here, it can be seen with the measure of total autonomy that those in a condition of low autonomy are significantly less satisfied and effective than those in a condition of high autonomy so that high levels of total autonomy are reflected in high levels of job satisfaction and effectiveness. When the measures of non-work-task and work-task autonomy are considered, however, there is no significant difference in the means recorded for job satisfaction and effectiveness in a condition of high or low autonomy. When the medians for job satisfaction are considered, those in conditions of low non-work-task and work-task autonomy are slightly more satisfied than those in a condition of high autonomy. This is quite surprising when one considers that the measure of total autonomy is an additive index comprised of non-work-task and work-task autonomies. What these results may be illustrating is the importance of both non-work-task and work-task autonomy for overall job satisfaction. A high score on work-task or non-work-task autonomy without a correspondingly high score on the other measure of autonomy may not be sufficient to ensure job satisfaction.

Although the relationship is not significant for non-work-task or work-task autonomy, those in conditions of low autonomy are not judged to be as effective as those in a condition of high autonomy.

To recapitulate, it would appear that significant natural relationships exist such that high levels of total autonomy and group cohesiveness are reflected in high levels of job satisfaction and effectiveness. A tendency for high levels of non-work-task and work-task autonomy to be reflected in high levels of effectiveness is also noted. These results, in conjunction with the tendencies of different measures of danger to affect job satisfaction and effectiveness, for an important basis for subsequent analysis employing complex controls.

Before control conditions become more complex, it would appear to be important to discover what effect the occupational group will have upon job satisfaction and effectiveness under conditions of high and low danger. Since the effect of high and low danger upon job satisfaction and effectiveness is already known, examining differences between miners and mill operators in conditions of high and low danger offers the opportunity of not only assessing the impact of the occupational group upon job satisfaction and effectiveness, but of allowing the impact of different levels of danger, between and within occupational groups, to be assessed.

The Effect of Danger and Occupational Group Upon Job Satisfaction and Effectiveness

In Table 4-3, job satisfaction and effectiveness scores are given for miners and mill operators in conditions of high and low danger. Danger is computed, in this instance, according to the respondents' own perceptions of its existence.

Results in this table demonstrate that miners in a condition of high danger are less satisfied with their jobs than those in a condition of low danger with a mean score of 130.21 recorded in low danger in comparison to 122.67 recorded in high danger. This situation, although still not significant, becomes even more pronounced when medians are compared. Here, in a situation of high danger, the median is 125.25 in comparison to a median of 145.75 in low danger.

This situation is reversed for miners when effectiveness is considered. Miners reporting high danger have a mean effectiveness score of 17.51 in comparison to miners reporting low danger, who have a mean effectiveness score of 16.77. The medians also follow this trend with a median of 18.00 recorded in high danger and a median of 17.50 in low danger.

Conditions are somewhat different for mill operators. Here, mill operators in a condition of high danger have a

Table 4-3

The Effect of Danger and Occupational Group Upon Job Satisfaction and Effectiveness

	JOB SATISFACTION			N	EFFECTIVENESS			N
MINERS	MEAN	SD	MEDIAN		MEAN	SD	MEDIAN	
LOW DANGER	130.21	40.38	145.75	(19)	16.77	4.03	17.50	(30)
HIGH DANGER	122.67	30.92	125.25	(37)	17.51	3.69	18.00	(39)
MILL OPERATORS								
LOW DANGER	99.17	30.22	107.00	(23)	17.11	4.84	17.50	(18)
HIGH DANGER	107.00	31.51	103.50	(14)	16.33	4.12	16.33	(9)

Results of T-Tests

	JOB SATISFACTION	EFFECTIVENESS
Groups 1 & 2	.482 NS	.432 NS
Groups 1 & 3	.009 SIG	.791 NS
Groups 3 & 4	.463 NS	.659 NS
Groups 2 & 4	.125 NS	.447 NS

higher job satisfaction score than do mill operators in a condition of low danger with a mean score of 107.00 recorded in high danger in comparison to 99.17 in low danger. When medians are considered, this trend is reversed. A median of 107.00 is found in low danger in contrast to a median of 103.50 in high danger. Such differences are slight and certainly not of the same magnitude found amongst miners in different conditions of danger.

While miners reporting high danger were considered to be more effective than those reporting low danger, such is not the case with mill operators. Here, mill operators in a condition of high danger have a mean effectiveness score of 16.33 while those in low danger have a score of 17.11. These results are somewhat more pronounced when medians are considered with 17.50 recorded in low danger versus 16.33 in high danger.

Of all the relationships discussed, the only significant one concerns the differences between miners and mill operators in a condition of low danger. A highly significant relationship (at the .009 level) exists such that miners in a situation of reported low danger are more satisfied with their jobs than mill operators in low danger.

It would appear, with even a cursory appraisal of Table 4-3, that despite the control condition of danger, miners in general, are more satisfied with their jobs than are mill operators. A check on this fact, disregarding the element of danger, reveals that the mean job satisfaction score for all miners is 126.14 in comparison to 102.13 for mill operators, with the difference significant at the .001 level.

When the results of Table 4-3 are compared to those found in Table 4-1, it appears that the addition of the occupational group as a control condition has ~~certain~~ consequences. First, the overall trend in Table 4-1 of higher levels of job satisfaction being associated with conditions of high danger does not hold for miners. In fact, the reverse is true. Second, the overall trend of high effectiveness ratings being associated with high levels of danger as found in Table 4-1 is just the opposite for mill operators.

Although some differences do exist between miners and mill operators, with, and without controlling for danger; certain factors mitigate against the continued use of the occupational group as a control condition. First, the emphasis of this study is on understanding how underground miners cope with danger and the inclusion of mill operators into the sampling frame was done primarily to ensure variability in the measures of danger employed. By utilizing the occupational group as a control condition, emphasis may be deflected away from t

how coping is accomplished to an examination of differences between occupational groups. Second, although some mill operators (38%) may regard their jobs as dangerous, more miners (67%) regard their jobs as dangerous. When it is considered that only 48 mill operators are in the sample and only 38 percent regard their jobs as dangerous, it appears that if extensive controls are employed, a small number of mill operators will fall in the high danger category. With a potentially small number of mill operators in a high danger category, comparison and generalization may be suspect. Third, from a purely practical standpoint, the form of data analysis employed in this study makes extensive use of various control conditions, and the addition of another control condition would undoubtably make generalization virtually impossible. This does not mean that differences between occupational groups are unimportant, but only that clarity and parsimony are preferred. This latter point gains greater credence in a relatively unchartered field such as this, especially when a wider scope would, if it is remembered that only a few mill operators fall in the high danger category, result in generalizations of dubious value.

At this point, sufficient preliminary analysis of control conditions has been completed so that it is possible to adequately assess the impact of independent variables upon job satisfaction and effectiveness under different conditions and types of danger. The first independent variable to be considered is group cohesiveness and attention is now directed toward analysis of its effects.

Group Cohesiveness

The Effect of Cohesiveness Upon Job Satisfaction And Effectiveness Under Conditions of Danger

Tables 4-4 and 4-5 both represent the effects of cohesiveness upon job satisfaction and effectiveness. Table 4-4, however, represents conditions of danger as perceived by the respondents themselves and Table 4-5 represents conditions of danger as perceived by the respondents' supervisors. Both tables will be analyzed individually and, if noticeable differences exist between them, these differences will be explored.

In Table 4-4, it can be seen that in a condition of high danger and high cohesiveness both mean job satisfaction and effectiveness scores are significantly higher than in a condition of high danger and low cohesiveness. The mean job satisfaction score in high danger and high cohesiveness is 135.59 in comparison to 109.77 found in high danger and low cohesiveness while the mean

Table 4-4

The Effect of Cohesiveness upon Job Satisfaction and Effectiveness Under Conditions of Danger as Perceived by Respondents

		JOB SATISFACTION			N	EFFECTIVENESS			N
		MEAN	SD	MEDIAN		MEAN	SD	MEDIAN	
HIGH DANGER	LOW COHESIVENESS	109.77	33.18	103.50	(34)	16.64	4.16	16.63	(34)
	HIGH COHESIVENESS	135.59	19.26	135.25	(17)	18.73	2.15	18.75	(17)
LOW DANGER	LOW COHESIVENESS	96.72	35.07	95.50	(18)	15.06	5.00	15.50	(18)
	HIGH COHESIVENESS	125.58	35.65	120.50	(24)	17.90	3.42	18.33	(24)

Results of T-TESTS*

	JOB SATISFACTION	EFFECTIVENESS
Groups 1 & 2	.001 SIG	.026 SIG
Groups 1 & 3	.208 NS	.286 NS
Groups 3 & 4	.014 SIG	.054 SIG
Groups 2 & 4	.586 NS**	.322 NS

* all T-TESTS are two-tailed unless otherwise stated

** significant at .05 level using Median Test outlined by Horowitz (1974:402-404)

Table 4-5

The Effect of Cohesiveness Upon Job Satisfaction and Effectiveness Under Conditions of Danger As Perceived by Respondents' Supervisors

		JOB SATISFACTION			N	EFFECTIVENESS			N
		MEAN	SD	MEDIAN		MEAN	SD	MEDIAN	
HIGH DANGER	LOW COHESIVENESS	108.97	28.60	103.00	(30)	16.36	4.59	16.88	(31)
	HIGH COHESIVENESS	138.63	28.11	142.00	(19)	18.19	3.37	18.50	(26)
LOW DANGER	LOW COHESIVENESS	116.79	35.13	111.00	(14)	15.72	4.34	15.75	(18)
	HIGH COHESIVENESS	128.28	34.09	125.00	(14)	18.15	2.70	18.50	(20)

Results of T-TESTS

	JOB SATISFACTION	EFFECTIVENESS
Groups 1 & 2	.001 SIG	.088 NS*
Groups 1 & 3	.476 NS	.633 NS
Groups 3 & 4	.387 NS	.050 SIG
Groups 2 & 4	.363 NS	.963 NS

*Median Test significant at the .05 level effectiveness score in high danger and high cohesiveness is 18.73 in contrast to 16.64 found in high danger and low cohesiveness. No marked deviations from these tendencies are noted when the medians are considered. In fact, the only noticeable difference occurs in a condition of high danger and low cohesiveness where a mean of 109.77 compares to a median of 103.50.

Continuing with Table 4-4, it can be seen that in a condition of low danger and high cohesiveness both mean job satisfaction and effectiveness scores are significantly higher than in a condition of low cohesiveness and low danger. The mean job satisfaction score in low danger and high cohesiveness is 125.58 in comparison to 96.72 found in low danger and low cohesiveness while the mean effectiveness score in low danger and high cohesiveness is 17.90 in contrast to 15.06 found in low danger and low cohesiveness.

The medians conform quite closely to the mean scores in low danger except when job satisfaction is considered in a situation of low danger and high cohesiveness. A mean job satisfaction score of 125.58 contrasts with a median of 120.50. This becomes quite important when the effect of high cohesiveness is compared in situations of high and low danger. Using a median test, a significant difference is found, so that those in a situation of high danger and high cohesiveness are more satisfied with their jobs than those in low danger and high cohesiveness. It would appear then, that high levels of cohesiveness are important in situations of high danger.

As a general tendency, satisfaction and effectiveness scores appear to be higher in situations of high danger than in low danger, when equal amounts of cohesiveness are present. The addition of high cohesiveness increases satisfaction and effectiveness levels in both high and low danger, but remarkably so in a condition of high danger. The results in Table 4-4 follow the trends noted in Tables 4-1 and 4-2.

In Table 4-5, the same tendencies are noted as occurred in Table 4-4. Those in a situation of high danger and high cohesiveness are significantly more satisfied with their jobs than are those in high danger and low cohesiveness. A mean job satisfaction score of 108.97 in high danger and low cohesiveness contrasts with a score of 138.63 in high danger and high cohesiveness. When effectiveness is considered, a mean effectiveness score of 18.19 is recorded in high danger and high cohesiveness versus a score of 16.36 in high danger and low cohesiveness. These means are not significantly different, but a median test performed to examine the difference between a median of 16.88 in high danger and low cohesiveness and a median of 18.50 in high danger and high cohesiveness was significant at the .05 level.

In Table 4-4, those in a situation of low danger and high cohesiveness were significantly more satisfied and effective than were those in a situation of low danger and low cohesiveness. This trend is still evident in Table 4-5 with a mean job satisfaction score of 116.79 recorded in a condition of low danger and low cohesiveness compared to 128.28 found in low danger and high cohesiveness, but the relationship is not significant even when medians are compared. When effectiveness is considered however, a mean score of 18.95 in a condition of low danger and high cohesiveness is significantly higher than a mean of 15.72 in low danger and low cohesiveness.

In Table 4-4, a significant difference in medians was noted between a condition of high danger and high cohesiveness and a condition of low danger and high cohesiveness. Such is not the case in Table 4-5. This is quite surprising when a significant difference in medians occurred in Table 4-4 with medians of 135.25 and 120.50 and yet, in Table 4-5, medians of 142.00 and 125.00 produce no significant difference. A glance at the number of respondents reveals that when job satisfaction is considered, there are 95 total respondents in Table 4-4 in comparison to 77 total respondents in Table 4-5. Of crucial importance in computing a Median Test in the frequency of responses above and below the median. With 18 fewer respondents in Table 4-5, it is no wonder differences between groups are not significant.

Although differences are evidenced, it does appear that the same trends are observed between group cohesiveness and job satisfaction/effectiveness whether danger is measured according to the respondents' or their supervisors' perceptions of it. These results suggest once again the comparability of the two measures of danger, as well as highlighting the general finding that high levels of group cohesiveness are reflected in increased job satisfaction and effectiveness. What is most remarkable, however, is the positive impact that high levels of group cohesiveness have upon job satisfaction and effectiveness in a high danger situation. It does indeed appear that group cohesiveness is a potentially important factor in coping with danger.

The relationships between group cohesiveness and both job satisfaction and effectiveness have now been presented. The positive impact of group cohesiveness is consistent with the results noted in previous research (cf. Gross,1954; Marquis et al.,1951; Van Zelst,1952a and b; Exline,1957; Trist, Higgin, Murray and Pollack, 1963 and Turner and Lawrence,1965), but the actual strength of the relationships between group cohesiveness and the dependent variables, as well as the relative importance of group cohesiveness for coping with danger will be analyzed and discussed in subsequent chapters.

Now, attention will be focussed on analyzing the impact autonomy has on job satisfaction and effectiveness under different conditions and types of danger.

Autonomy

As was done with group cohesiveness, the effect of autonomy upon job satisfaction and effectiveness will be investigated under various control conditions. These control conditions will include differences in the amount of danger present and differences in the way in which danger is measured.

Certain specific goals are held in mind. First, since three measures of autonomy are to be employed in the analysis, it would be most interesting to observe the similarities and dissimilarities that occur in the effects of these measures of autonomy upon job satisfaction and effectiveness. Such a strategy offers a potential for discovering what measure of autonomy is most salient in a given situation. Second, since two measures of danger are to be employed, the existence of different results under equivalent levels of autonomy may produce the stimulus needed to provide further insight into not only the nature of danger, but the coping process as well.

The three measures of autonomy are non-work-task autonomy, work-task autonomy and total autonomy. Attention will first be directed toward non-work-task autonomy, followed by work-task autonomy, and finally followed by total autonomy.

Non-Work-Task Autonomy

The Effect of Non-Work-Task Autonomy Upon Job Satisfaction and Effectiveness

Table 4-6 and Table 4-7, both demonstrate the effects of high and low amounts of non-work-task autonomy upon job satisfaction and effectiveness under conditions of high and low danger. The only difference between these tables concerns the measure of danger employed. In Table 4-8, danger is measured according to the respondents' own perceptions of its existence and in Table 4-9, danger is measured according to the respondents' supervisors' perceptions of its existence.

In Table 4-6, very little difference exists between those in a condition of high danger and those in a condition of low danger when the effect of different levels of autonomy upon job satisfaction is considered. In fact, the greatest difference found between any means is only 8.28 and that is found when a situation of high danger and high autonomy is compared to a condition of low danger and low autonomy with a mean job satisfaction

Table 4-6

The Effect of Non-Work-Task Autonomy upon Job Satisfaction and Effectiveness Under Conditions of Danger as Perceived by Respondents

		JOB SATISFACTION			N	EFFECTIVENESS			N
		MEAN	SD	MEDIAN		MEAN	SD	MEDIAN	
HIGH DANGER	LOW AUTONOMY	116.77	36.09	124.50	(22)	17.50	3.29	17.50	(20)
	HIGH AUTONOMY	119.59	28.28	122.00	(29)	17.14	4.12	17.50	(28)
LOW DANGER	LOW AUTONOMY	111.31	37.28	115.50	(16)	15.46	4.71	15.33	(21)
	HIGH AUTONOMY	114.39	39.26	115.50	(26)	18.12	3.39	18.30	(26)

Results of T-TESTS

	JOB SATISFACTION	EFFECTIVENESS
Groups 1 & 2	.764 NS	.740 NS
Groups 1 & 3	.654 NS	.118 NS
Groups 3 & 4	.891 NS	.038 SIG
Groups 2 & 4	.579 NS	.346 NS

Table 4-7

The Effect of Non-Work-Task Autonomy upon Job Satisfaction and Effectiveness Under Conditions of Danger as Perceived by Respondents' Supervisors

		JOB SATISFACTION			N	EFFECTIVENESS			N
		MEAN	SD	MEDIAN		MEAN	SD	MEDIAN	
HIGH DANGER	LOW AUTONOMY	121.57	30.84	129.00	(24)	16.96	4.35	17.67	(25)
	HIGH AUTONOMY	120.04	32.92	116.00	(27)	17.38	4.04	17.70	(32)
LOW DANGER	LOW AUTONOMY	115.17	39.16	110.50	(12)	15.69	3.83	15.30	(16)
	HIGH AUTONOMY	128.06	30.62	124.50	(16)	17.96	3.43	18.83	(22)

Results of T-TESTS

	JOB SATISFACTION	EFFECTIVENESS
Groups 1 & 2	.869 NS	.714 NS
Groups 1 & 3	.632 NS	.332 NS
Groups 3 & 4	.356 NS	.069 NS*
Groups 2 & 4	.425 NS.	.573 NS

* Median Test significant at .05 level

score of 113.31 recorded in the latter condition versus a mean score of 119.59 recorded in the former condition.

When effectiveness is considered, a significant relationship emerges such that those in a condition of low danger and high non-work-task autonomy are more effective than those in a condition of low danger and low non-work-task autonomy. Here, a mean effectiveness score of 15.46 in the latter condition opposes a mean effectiveness score of 18.12 in the former condition.

In Table 4-7, much the same results are found in the case of job satisfaction, but certain differences do exist. In Table 4-6, for example, those in a condition of high danger and low autonomy record a mean job satisfaction score of 116.77, while those in the high danger/high autonomy category register a score of 119.59. The situation is reversed when medians are considered. A median of 124.50 is found in the high danger/low autonomy category versus 120.00 found in the high danger/high autonomy category. In Table 4-7, those in a condition of high danger and low autonomy record a mean job satisfaction score of 121.57 in comparison to 120.04 found in high danger and high autonomy. Median scores are somewhat more striking with 116.00 registered in the latter category and 129.00 found in the former category.

When effectiveness is considered, those in a condition of high danger and low autonomy in Table 4-6, evidence a mean effectiveness score of 17.50 in comparison to a score of 17.14 found in high danger and high autonomy. Medians are identical with a score of 17.50 found in both categories. In Table 4-7, those in the high danger/ low autonomy category register a mean effectiveness score of 16.96 in comparison to a score of 17.68 found in the high danger/high autonomy category. Medians, however, are virtually identical with 17.70 recorded in the latter category and 17.67 registered in the former category.

The fact that in a situation of high danger some conflicting results between measures and no significant relationships exist is, in itself, important to discover for it now appears that, in a condition of high danger, the addition of increases in non-work-task autonomy will not result in significant increases in job satisfaction and effectiveness. When it is considered that non-work-task autonomy refers to "the amount of discretion or personal freedom that a worker can exercise during slack periods" (White,1972:92), these results are hardly surprising. Non-work-task autonomy has been conceptualized and measured in a form which virtually asks: "How free are you from your work group, dominant individuals and your supervisor?" Those who score high on this measure are "Left on their own" and, if Mechanic's work (1974:34) is to be believed, successful coping requires a co-operative effort. In a situation of high danger, people become very important and to be "left on one's own" is to be divorced from the potential social support available in the environment.

In a situation of low danger, non-work-task autonomy becomes much more of an operative force. Although little difference exists between the effect of high and low autonomy upon job satisfaction in Table 4-6, results in Table 4-7 find those in a situation of low danger and low autonomy with a mean job satisfaction score of 115.17 compared to a score of 128.06 found in low danger and high autonomy. A median of 124.50 is recorded in the latter condition versus a median of 110.50 in the former condition. The question that naturally arises concerns why results would be stronger in Table 4-7 than in Table 4-6?

A natural inclination might be to ignore the discrepancy because the relationship is not significant or delve deeply into the differences between the two measures of danger, even though their comparability has been demonstrated. In attempting to account for this discrepancy, two factors should be borne in mind. First, as was pointed out earlier in the discussion on occupational groups, mill operators, in general, have a significantly lower job satisfaction level than do miners. Second, as was noted in Chapter 3, two of the supervisors in the mill refused to fill out the Supervisor's Rating Scale and, as a result, mill operators are under-represented in Table 4-7. The inclusion of these mill operators in Table 4-7 might well have depressed the mean satisfaction scores in such a manner as to make them more comparable with those found in Table 4-6.

Although certain differences are noted in the case of job satisfaction, a consistently significant relationship is found in both Table 4-6 and Table 4-7. Here, in a situation of low danger, those possessing high non-work-task autonomy are more effective than those who do not. In Table 4-6, this significant difference is found between means of 15.46 and 18.12. In Table 4-7, a significant difference is found between medians of 15.33 and 18.30.

In general, it appears that high levels of non-work-task autonomy have little impact on job satisfaction in either a situation of high or low danger. Non-work-task autonomy does, however, have a significant impact on effectiveness in a low, rather than high, danger situation. Since co-operative efforts may be necessary to reduce the effects of work danger and a high level of non-work-task autonomy may be akin to social isolation, these results are not surprising. In fact, non-work-task autonomy does not appear to be an aid in coping with danger at all.

The next section focusses on the effect work-task autonomy has upon job satisfaction and effectiveness under different levels and types of danger.

Work-Task Autonomy

The Effect of Work-Task Autonomy Upon Job Satisfaction and Effectiveness

Table 4-8 and Table 4-9 both demonstrate the effects of high and low amounts of work-task autonomy upon job satisfaction and effectiveness under conditions of high and low danger. The only difference between these tables concerns the measure of danger employed. In Table 4-8, danger is measured according to the respondents' own perceptions of its existence and in Table 4-9, danger is measured according to the respondents' supervisors' perceptions of its existence.

In Table 4-8, a consistent pattern emerges, in both high and low danger, whereby those respondents possessing high work-task autonomy record higher job satisfaction and effectiveness scores than do those possessing low work-task autonomy. The highest satisfaction and effectiveness scores are recorded in a condition of high danger and high autonomy. Although no significant differences exist between the various categories, it does appear that increases in work-task autonomy may result in slight increases in job satisfaction and effectiveness. When

Table 4-8

The Effect of Work-Task Autonomy upon Job Satisfaction and Effectiveness Under Conditions of Danger as Perceived by Respondents

		JOB SATISFACTION			N	EFFECTIVENESS			N
		MEAN	SD	MEDIAN		MEAN	SD	MEDIAN	
HIGH DANGER	LOW AUTONOMY	116.32	31.27	122.50	(28)	16.54	4.05	17.17	(26)
	HIGH AUTONOMY	120.87	32.45	134.00	(23)	18.18	3.25	18.50	(22)
LOW DANGER	LOW AUTONOMY	111.00	40.73	107.50	(20)	16.78	4.15	17.25	(23)
	HIGH AUTONOMY	115.23	36.35	115.50	(22)	17.08	4.33	17.83	(24)

Results of T-TESTS

	JOB SATISFACTION	EFFECTIVENESS
Groups 1 & 2	.615 NS	.126 NS
Groups 1 & 3	.627 NS	.836 NS
Groups 3 & 4	.726 NS	.809 NS
Groups 2 & 4	.586 NS	.334 NS

Table 4-9

The Effect of Work-Task Autonomy Upon Job Satisfaction and Effectiveness Under Conditions of Danger as Perceived by Respondents' Supervisors

		JOB SATISFACTION			N	EFFECTIVENESS			N
		MEAN	SD	MEDIAN		MEAN	SD	MEDIAN	
HIGH DANGER	LOW AUTONOMY	122.09	5.35	124.67	(31)	16.74	4.54	17.50	(34)
	HIGH AUTONOMY	118.18	35.78	134.75	(17)	17.87	3.48	18.00	(23)
LOW DANGER	LOW AUTONOMY	119.44	28.98	123.50	(9)	16.47	2.80	16.25	(15)
	HIGH AUTONOMY	124.00	37.44	121.00	(19)	17.35	4.25	18.00	(23)

Results of T-TESTS

	JOB SATISFACTION	EFFECTIVENESS
Groups 1 & 2	.703 NS	.291 NS
Groups 1 & 3	.814 NS	.802 NS
Groups 3 & 4	.728 NS	.446 NS
Groups 2 & 4	.636 NS	.651 NS

medians are considered, the greatest gains are found in a condition of high danger when work-task autonomy is increased. Respondents possessing low autonomy record a median satisfaction score of 122.50 and a median effectiveness score of 17.17 in comparison to respondents in a condition of high autonomy who register median satisfaction and effectiveness rates of 134.00 and 18.50 respectively. Results of this nature suggest that high levels of work-task autonomy may be more salient in conditions of high danger.

In attempting to account for this finding, the definition of work-task autonomy should be recalled. Work-task autonomy (White,1972:92) refers to "the amount of personal discretion or freedom a worker can exercise when performing the tasks and duties required by his job". Work-task autonomy is distinguished from non-work-task autonomy by placing emphasis solely on the freedom allowed when performing the requirements demanded by the job, whereas non-work-task autonomy concentrates on the freedom accorded a worker when not performing duties required by the job. This distinction is important when results in conditions of high danger are analyzed for greater amounts of concentration are necessary in order to avoid potential hazards. Interference from others may destroy concentration and increase the risk to workers. Increased risk may result in lowered job satisfaction and absenteeism.

In a situation of high danger, a worker during slack periods may wish to draw upon the support of others and, as such, great amounts of non-work-task autonomy would not be appreciated.

Closely allied with concentration is the importance of continuity. When a worker is performing a job, especially in the case of miners, what is very important in maintaining an acceptable level of quality and quantity in output is the ability to see a job through without interruption. High levels of work-task autonomy may allow greater satisfaction and effectiveness by freeing the worker from breaks in concentration and continuity.

On both Table 4-9 and Table 4-8, those in conditions of high autonomy record the higher effectiveness scores with the highest mean effectiveness score found in a condition of high danger and high autonomy.

When the effect of different conditions of danger and autonomy upon job satisfaction is considered in Table 4-9, results are somewhat different than was the case in Table 4-8. In Table 4-8 a consistent pattern emerges whereby those possessed of high autonomy recorded the higher satisfaction scores. In Table 4-9, those in a condition of high danger and low autonomy record a mean satisfaction score of 122.09 in comparison to a score of 118.18 found in high danger and high autonomy. Results in Table 4-9 parallel those in Table 4-8 when medians are considered, with a median of 134.75 registered in the latter category and a median of 124.67 found in the former category.

In a condition of low danger, the mean scores in Table 4-9 parallel those found in Table 4-8, but the median scores do not. A mean job satisfaction score of 119.44 is found in the low autonomy condition versus a mean score of 124.00 found in a condition of high autonomy, but the median in the latter category is 121.00 in comparison to a median of 123.50 in the former category. These differences are slight and, although no significant relationships exist, a certain amount of doubt is cast upon the proposed trend of high work-task autonomy being reflected in higher job satisfaction scores. It must be remembered, of course, that in Table 4-8 the job satisfaction analysis involved ninety three respondents, but in Table 4-9 only seventy six respondents were involved due to the refusal of three supervisors to fill out the Supervisor's Rating Scale. Although differences between the tables can be discounted somewhat, what these differences in the effects on job satisfaction and the consistent results found in the case of effectiveness may be pointing to, is the possibility that work-task autonomy may be more salient when it acts upon effectiveness. This explanation has a certain intuitive sense of authenticity when it is considered that a worker may be more effective if he is allowed to complete his tasks without interruption.

Although it does appear that work-task autonomy has some positive impact on job satisfaction and effectiveness in a high danger situation, the results are far from conclusive and further clarification is necessary. This clarification will be offered in subsequent chapters, but the next focus of inquiry in this chapter will be on the effect of total autonomy upon job satisfaction and effectiveness.

Total Autonomy

The Effect of Total Autonomy Upon Job Satisfaction and Effectiveness

Table 4-10 and Table 4-11, both examine the effects of high and low amounts of total autonomy upon job satisfaction and effectiveness under conditions of high and low danger. The only difference between these tables concerns the measure of danger employed. In Table 4-10, danger is measured according to the respondents' own perceptions of its existence and in Table 4-11, danger is measured according to the respondents' supervisors' perceptions of its existence.

In Table 4-10, a consistent trend is evidenced

Table 4-10

The Effect of Total Autonomy Upon Job Satisfaction and Effectiveness Under Conditions of Danger as Perceived by Respondents

		JOB SATISFACTION			N	EFFECTIVENESS			N
		MEAN	SD	MEDIAN		MEAN	SD	MEDIAN	
HIGH DANGER	LOW AUTONOMY	106.00	33.20	108.00	(23)	15.80	3.72	15.50	(21)
	HIGH AUTONOMY	128.54	26.64	134.00	(28)	18.36	3.47	19.00	(27)
LOW DANGER	LOW AUTONOMY	105.65	42.17	96.00	(17)	15.68	4.65	16.00	(22)
	HIGH AUTONOMY	118.36	34.98	120.00	(25)	18.04	3.48	18.20	(25)

Results of T-TESTS

	JOB SATISFACTION	EFFECTIVENESS
Groups 1 & 2	.012 SIG	.021 SIG
Groups 1 & 3	.977 NS	.928 NS
Groups 3 & 4	.313 NS	.059 NS
Groups 2 & 4	.244 NS	.741 NS

Table 4-11

The Effect of Total Autonomy Upon Job Satisfaction and Effectiveness Under Conditions of Danger as Perceived by Respondents' Supervisors

		JOB SATISFACTION			N	EFFECTIVENESS			N
		MEAN	SD	MEDIAN		MEAN	SD	MEDIAN	
HIGH DANGER	LOW AUTONOMY	106.18	30.68	103.50	(16)	15.50	4.00	15.50	(16)
	HIGH AUTONOMY	128.71	28.68	135.50	(28)	18.35	3.21	18.50	(34)
	LOW AUTONOMY	105.65	42.17	96.00	(17)	15.68	4.65	16.00	(22)
	HIGH AUTONOMY	130.22	31.30	124.50	(18)	17.78	3.66	18.25	(23)

Results of T-TESTS

	JOB SATISFACTION	EFFECTIVENESS
Groups 1 & 2	.023 SIG	.020 SIG
Groups 1 & 3	.967 NS	.898 NS
Groups 3 & 4	.061 NS	.101 NS
Groups 2 & 4	.870 NS	.547 NS

throughout. Those possessed of high total autonomy are more satisfied and effective than those possessing low total autonomy. The relationships are most salient in a condition of high danger where two significant relationships occur. First, those in a condition of high danger and high total autonomy are more satisfied with their jobs than are those in a condition of low total autonomy. Second, those in a condition of high danger and high total autonomy are more effective than are those in a condition of high danger and low total autonomy. Although no significant relationships occur in a condition of low danger, the same tendency exists with higher autonomy scores being reflected in higher satisfaction and effectiveness scores.

In Table 4-11, the results parallel those in Table 4-10 with higher levels of total autonomy being reflected in higher job satisfaction and effectiveness scores. The results appear most salient in a condition of high danger with the same two significant relationships occurring in Table 4-10, reoccurring in Table 4-11.

It does appear that total autonomy may be an important factor in coping with danger. This is consistent with the literature showing the importance of autonomy for increasing job satisfaction and effectiveness levels (cf., Trist and Bamforth,1951; Gouldner,1954; Lipset, Trow and Coleman,1954; Walker and Guest,1954; Chinoy, 1955; Strauss and Bavelas,1955; Morse and Reimer,1956 and

Trist, Higgin, Murray and Pollack,1963), but somewhat of a surprise, when it is considered that the measure of autonomy is formulated by combining the non-work-task and work-task items together and the singular measures of non-work-task and work-task autonomy did not offer conclusive evidence of a positive relationship with either job satisfaction or effectiveness. What these results may be indicating, as was pointed out earlier in this chapter, is the importance of a combination of non-work-task and work-task autonomy for increased satisfaction and effectiveness levels. This possibility will be examined in the following chapters, but another interesting possibility comes to mind. If group cohesiveness and autonomy are singularly important means of coping with danger, what will the combined impact of group cohesiveness and autonomy be on job satisfaction and effectiveness? The next section of this chapter attempts to come to grips with this question.

Autonomy and Group Cohesiveness

Since consistent results between the various measures of autonomy were not always present, it would be useful to examine the effect of autonomy and group cohesiveness upon job satisfaction and effectiveness under different conditions of danger employing all three measures of autonomy. As a result, this section has three major subdivisions with the only difference between them concerning the measure of autonomy employed. The first subdivision is as follows:

The Effect of Group Cohesiveness and Non-Work-Task Autonomy Upon Job Satisfaction and Effectiveness

Both Table 4-12 and Table 4-13 examine the effect of group cohesiveness and non-work-task autonomy upon job satisfaction and effectiveness under conditions of high and low danger. The only difference between these tables concerns the measure of danger employed. In Table 4-12, danger is computed according to how the respondents perceive it. In Table 4-13, danger is computed according to how their supervisors perceive it.

In Table 4-12, when *only* those in a situation of *high* danger are considered, certain significant differences emerge. First, *those in a condition of high cohesiveness and high non-work-task autonomy are more satisfied with their jobs than are those in a condition of low cohesiveness and low non-work-task autonomy*. This result is consistent with the literature reviewed in Chapter 1 and comes as little surprise. What appears to be more important is to discover which of the two variables appears to contribute most to increasing satisfaction and/or effectiveness levels. The next significant relationship begins

Table 4-12

The Effect of Cohesiveness and Non-Work-Task Autonomy upon Job Satisfaction and Effectiveness under Conditions of Danger as Perceived by Respondents

HIGH DANGER		JOB SATISFACTION			N	EFFECTIVENESS			N
		MEAN	SD	MEDIAN		MEAN	SD	MEDIAN	
LOW COHESIVENESS	LOW AUTONOMY	107.33	39.99	108.00	(15)	16.77	3.63	15.75	(13)
HIGH COHESIVENESS	LOW AUTONOMY	136.14	13.67	135.50	(7)	18.85	2.12	19.00	(7)
HIGH COHESIVENESS	HIGH AUTONOMY	135.20	23.13	135.50	(10)	18.63	2.33	18.50	(8)
LOW COHESIVENESS	HIGH AUTONOMY	111.37	27.73	103.30	(19)	16.55	4.56	17.17	(20)
LOW DANGER									
LOW COHESIVENESS	LOW AUTONOMY	94.57	35.33	92.00	(7)	14.00	5.76	11.50	(8)
HIGH COHESIVENESS	LOW AUTONOMY	124.33	35.12	121.25	(9)	16.39	3.91	16.75	(13)
HIGH COHESIVENESS	HIGH AUTONOMY	126.33	37.17	124.00	(15)	19.00	2.62	18.83	(18)
LOW COHESIVENESS	HIGH AUTONOMY	98.09	37.59	107.00	(11)	16.13	4.22	16.50	(8)

Results of T-TESTS

	Job Satisfaction	Effectiveness
Groups 1 & 2	.024 SIG	.122 NS*
Groups 3 & 4	.022 SIG	.126 NS
Groups 5 & 6	.118 NS	.323 NS
Groups 7 & 8	.070 NS	.109 NS
Groups 1 & 3	.041 SIG	.170 NS
Groups 2 & 4	.020 SIG	.088 NS
Groups 5 & 7	.077 NS	.047 SIG
Groups 6 & 8	.125 NS	.890 NS
Groups 1 & 5	.449 NS	.251 NS
Groups 2 & 6	.376 NS	.083 NS
Groups 3 & 7	.470 NS	.720 NS
Groups 4 & 8	.322 NS	.818 NS

* Median Test significant at .05 level

Table 4-13

The Effect of Cohesiveness and Non-Work-Task Autonomy upon Job Satisfaction and Effectiveness Under Conditions of Danger as Perceived by Respondents' Supervisors

		JOB SATISFACTION			N	EFFECTIVENESS			N
HIGH DANGER		MEAN	SD	MEDIAN		MEAN	SD	MEDIAN	
LOW COHESIVENESS	LOW AUTONOMY	108.67	32.42	92.50	(12)	16.39	4.65	16.00	(13)
HIGH COHESIVENESS	LOW AUTONOMY	138.78	18.68	136.00	(9)	17.58	4.12	18.50	(12)
HIGH COHESIVENESS	HIGH AUTONOMY	138.50	35.64	142.50	(10)	18.71	2.61	18.50	(14)
LOW COHESIVENESS	HIGH AUTONOMY	109.18	26.61	103.00	(17)	16.33	4.68	17.17	(18)
LOW DANGER									
LOW COHESIVENESS	LOW AUTONOMY	115.33	45.11	103.50	(6)	14.63	4.69	15.17	(8)
HIGH COHESIVENESS	LOW AUTONOMY	115.00	36.60	117.50	(6)	16.75	2.61	15.50	(8)
HIGH COHESIVENESS	HIGH AUTONOMY	138.25	30.61	135.50	(8)	19.08	2.43	19.00	(12)
LOW COHESIVENESS	HIGH AUTONOMY	117.88	28.90	122.50	(8)	16.60	4.06	16.50	(10)

Results of T-TESTS

	JOB SATISFACTION	EFFECTIVENESS
Groups 1 & 2	.015 SIG	.501 NS
Groups 3 & 4	.039 SIG	.079 NS
Groups 5 & 6	.989 NS	.286 NS
Groups 7 & 8	.193 NS	.112 NS
Groups 1 & 3	.057 NS	.129 NS
Groups 2 & 4	.003 SIG	.448 NS
Groups 5 & 7	.315 NS	.033 SIG
Groups 6 & 8	.877 NS	.926 NS
Groups 1 & 5	.755 NS	.415 NS
Groups 2 & 6	.185 NS	.587 NS
Groups 3 & 7	.987 NS	.713 NS
Groups 4 & 8	.484 NS	.876 NS

to provide the needed insight. Here, *those possessing high levels of group cohesiveness and low levels of non-work-task autonomy are more satisfied with their jobs than are those in a condition of low group cohesiveness and non-work-task autonomy*. The existence of this relationship points out the importance of a high level of group cohesiveness for increasing job satisfaction levels in a situation of high danger. When medians are considered, *those possessing high levels of group cohesiveness and low levels of non-work-task autonomy are judged to be more effective than those in a condition of low group cohesiveness and non-work-task autonomy*. The existence of this relationship serves to point out the importance of a high level of group cohesiveness for increasing effectiveness levels in a situation of high danger.

The importance of high levels of group cohesiveness in a situation of high danger is also illustrated by the existence of *another significant relationship*. Here, *those in a condition of high cohesiveness and low non-work-task autonomy are more satisfied with their jobs than are those in a condition of low cohesiveness and high non-work-task autonomy*. The fact that a significant difference exists between these two conditions also points out the *relative unimportance of high levels of non-work-task autonomy for increasing job satisfaction levels in a* situation of high danger. This result is not particularly surprising, and falls in line with previous findings and the notion that a high level of non-work-task autonomy may be similar to a kind of social isolation, preventing the individual in a situation of high danger from drawing upon the social supports in the environment. This may be particularly irritating to an individual if he likes and respects the people within his work group.

Further evidence to demonstrate the relative unimportance of non-work-task autonomy is found in still another significant relationship. Here, those in a condition of high cohesiveness and high non-work-task autonomy are more satisfied with their jobs than are those in a condition of low cohesiveness and high non-work-task autonomy. Since both conditions contain high levels of non-work-task autonomy and danger, but only one contains high levels of group cohesiveness, and the one containing high levels of group cohesiveness has the greater satisfaction level, it must be the high level of group cohesiveness which is contributing to increased satisfaction rather than the non-work-task autonomy. Evidence is not confined solely to significant relationships for the mean satisfaction score in a condition of high cohesiveness and low non-work-task autonomy is 136.14 in comparison to a mean of 135.20 found in a condition of high cohesiveness and high non-work-task autonomy. A slight decline, but a decline nonetheless.

Although only one significant relationship exists when the effect of non-work-task autonomy and group cohesiveness upon effectiveness in a situation of high danger is considered, the same trend found in the case of job satisfaction is also found here. The lowest mean effectiveness score is found in a condition of low cohesiveness and high non-work-task autonomy and a mean effectiveness score of 18.85 in a condition of high cohesiveness and low non-work-task autonomy declines to 18.63 in a condition of high cohesiveness and high non-work-task autonomy.

In a situation of low danger in Table 4-12, only one significant relationship emerges. Here, *those in a condition of high cohesiveness and high non-work-task autonomy are judged to be more effective than those in a condition of low cohesiveness and low non-work-task autonomy*. This is not particularly surprising in view of the evidence amassed in Chapter 1 demonstrating the importance of autonomy and group cohesiveness for increased productivity. Despite the lack of significant relationships found in a low danger situation, some interesting trends are noted, especially when effectiveness is considered. Unlike the results found in the high danger situation, the lowest mean effectiveness score is not found in the low cohesiveness/low autonomy category. Although, the mean effectiveness rating of 16.39 in a condition of high cohesiveness and low autonomy is higher than the mean effectiveness rating of 16.13 found in a condition of low cohesiveness and high autonomy, the difference is slight. In a condition of high cohesiveness and high autonomy, the mean effectiveness score increases to 19.00. This result suggests that in a condition of low danger, high levels of group cohesiveness and non-work-task autonomy work together to increase effectiveness levels.

When the effect of different levels of non-work-task autonomy and group cohesiveness upon job satisfaction in a low danger situation is considered, no significant relationships are found. This lack of significant relationships suggests that perhaps high levels of group cohesiveness do not have quite the impact upon job satisfaction in a situation of low danger than they do in a situation of high danger. What a lack of significant relationships may be revealing is the increased impact of high levels of non-work-task autonomy in a low danger rather than high danger situation. In a condition of high cohesiveness and low autonomy, the mean job satisfaction score is 124.33 in comparison to a mean satisfaction score of 126.33 in a condition of high cohesiveness and high autonomy. The mean job satisfaction level decreased in a situation of high danger when respondents possessed high levels of group cohesiveness and non-work-task autonomy, but increased in a situation of low danger. Although, the mean job satisfaction score of 98.09 in a condition of low cohesiveness and high non-work-task autonomy is lower than that found in the high cohesiveness/low autonomy category, the difference between scores in a situation of low danger is not as great as found in these categories in a high danger situation. When medians are considered, the differences decline even more with a median of 121.25 found in a condition of high cohesiveness and low non-work-task autonomy versus a median of 107.00 found in a condition of low cohesiveness and high non-work-task autonomy. It appears, based on these results, that high levels of group cohesiveness do have impact in a situation of low danger, but this impact is not as great as that found in a high danger situation. Non-work-task autonomy appears to be slightly more salient in low rather than high danger.

In Table 4-13, results in the high danger situation parallel those found in Table 4-12 quite closely. Virtually the same significant relationships reoccur reinforcing the notion of the importance of high levels of group cohesiveness and the relative unimportance of high levels of non-work-task autonomy for increasing job satisfaction and effectiveness levels in a high danger situation.

In Table 4-13, results in the low danger situation parallel those in Table 4-12 quite closely when the effect of different levels of non-work-task autonomy and group cohesiveness upon effectiveness is considered, but noticeable differences occur when their effect upon job satisfaction is considered. Here, in a situation of low danger, the lowest mean job satisfaction score is found in a condition of high cohesiveness and low non-work-task autonomy. A mean satisfaction score of 115.00 in this category contrasts with a mean satisfaction score of 117.88 found in a condition of low cohesiveness and high non-work-task autonomy. The highest mean satisfaction score of 138.25 is found in a condition of high cohesiveness and high non-work-task autonomy. These results in Table 4-13 appear to be demonstrating the lack of impact of high levels of group cohesiveness upon job satisfaction in a situation of low danger and the more relative saliency of non-work-task autonomy. It also appears that high levels of group cohesiveness and non-work-task autonomy act in concert to increase satisfaction levels in a low danger situation.

The differences between Table 4-12 and Table 4-13 may be partially accounted for by differences in perceptions between respondents and their supervisors. A check on this possibility revealed some interesting results. Sixty-seven percent of the miners in this study regard their jobs as dangerous and this view is consistent with the outlook taken by their supervisors who consider sixty-five percent of these miners to be working in dangerous conditions. Such is not the case with mill operators, however, for thirty-eight percent of them regard their jobs as dangerous, but their supervisors consider sixty percent of them to be working in dangerous conditions. Obviously, the fact that two mill supervisors refused to fill out rating forms may have biased these results somewhat, but such a discrepancy cannot be ignored.

Gouldner (1954) in Patterns of Industrial Bureaucracy goes to great lengths to point out the differences between underground and surface workers. One factor he mentioned was the predominance of rules and regulations that proliferated on surface in comparison to the relative absence of these rules and regulations underground. Another factor Gouldner considered was the personality types of the two groups. Miners were free spirited, fun loving individuals in contrast to the mill operators who, being neat and meticulous, appeared almost dour in comparison. In attempting to account for these differences, Gouldner pointed out the hazardous nature of the underground work in comparison to the relative safety on surface. As the title of his work suggests, Gouldner was concerned, to some extent, with the form organizations took under different working conditions. In a sense, he was maintaining the appropriateness of a bureaucratic type of organization for mill operators and inappropriateness of the bureaucratic model for miners.

There is contained within the preceding discussion, an aspect which may help explain the discrepancy between mill operators' and their supervisors' perceptions of danger. This involves consideration of the mill supervisors themselves. These men at the setting chosen for this study, spent much of their working lives in a situation similar to what Gouldner described. A predominance of rules and regulations guided their conduct and compliance with these rules and regulations resulted in promotion. At this particular setting, a great deal of emphasis has been placed upon the prevention of accidents and these supervisors, schooled in a particular tradition, may have a tendency to accentuate potential hazards and, by so doing, consider the environment to be more dangerous than do the men themselves. A tendency of this nature has definite consequences for, as was noted earlier in this chapter, mill operators, in general, are significantly less satisfied with their jobs than are miners. By placing greater numbers of mill operators in a high danger situation, the mean satisfaction scores may be inflated in a low danger situation and deflated in a high danger situation. This explanation, however, appears most operative in a low danger situation where, in Table 4-13, three out of the four categories have higher mean and median satisfaction scores than those found in Table

4-12.

In general, it appears that group cohesiveness has significant impact on job satisfaction and effectiveness in a high danger situation, but is somewhat less salient in a low danger situation. Non-work-task autonomy, on the other hand, appears to have greatest influence on job satisfaction and effectiveness in a low, rather than high, danger situation. In combination, group cohesiveness and non-work-task autonomy appear to have the strongest influence on effectiveness in a low danger situation although, a noticeable effect was observed on job satisfaction in Table 4-13. This result, however, may have been due to the discrepancy between the mill operators' and their supervisors' perceptions of danger.

The relationships between non-work-task autonomy, group cohesiveness and the dependent variables of job satisfaction and effectiveness have now been examined. The question that naturally arises concerns whether these results will be duplicated when work-task autonomy is substituted for non-work-task autonomy. This becomes the next focus of inquiry.

The Effect of Group Cohesiveness and Work-Task Autonomy Upon Job Satisfaction and Effectiveness

Both Table 4-14 and Table 4-15 demonstrate the effect of group cohesiveness and work-task autonomy upon job satisfaction and effectiveness under conditions of high and low danger. The only difference between these two tables concerns the measure of danger employed. In Table 4-14, danger is computed according to how the respondents perceive it. In Table 4-15, danger is computed according to how the respondents' supervisors perceive it.

In Table 4-14, a number of significant relationships emerge between respondents in a situation of high danger. Here, those in a condition of high group cohesiveness and high work-task autonomy are more satisfied with their jobs and effective than are those in a condition of low group cohesiveness and low work-task autonomy. This finding demonstrates that high levels of group cohesiveness and work-task autonomy result in greater levels of job satisfaction and effectiveness. An important question that emerges concerns which of the two variables has the greatest impact on job satisfaction and effectiveness. The next significant relationship provides the needed insight. As was the case previously, a significant difference applies to both job satisfaction and effectiveness. Here, those in a condition of high group cohesiveness and high

Table 4-14

The Effect of Cohesiveness and Work-Task Autonomy upon Job Satisfaction and Effectiveness under Conditions of Danger as Perceived by Respondents

		JOB SATISFACTION			N	EFFECTIVENESS			N
HIGH DANGER		MEAN	SD	MEDIAN*		MEAN	SD	MEDIAN	
LOW COHESIVENESS	LOW AUTONOMY	110.84	33.89	103.25	(19)	16.16	4.55	16.75	(19)
HIGH COHESIVENESS	LOW AUTONOMY	127.89	22.20	124.00	(9)	17.57	2.15	17.75	(7)
HIGH COHESIVENESS	HIGH AUTONOMY	144.25	11.11	138.50	(8)	19.75	1.67	20.00	(8)
LOW COHESIVENESS	HIGH AUTONOMY	108.40	33.38	107.00	(15)	17.29	3.63	16.50	(14)
LOW DANGER									
LOW COHESIVENESS	LOW AUTONOMY	93.55	39.32	95.00	(11)	15.78	5.26	15.75	(9)
HIGH COHESIVENESS	LOW AUTONOMY	132.33	32.82	133.00	(9)	17.43	3.30	18.00	(14)
HIGH COHESIVENESS	HIGH AUTONOMY	121.53	37.75	119.00	(15)	18.29	3.57	18.75	(17)
LOW COHESIVENESS	HIGH AUTONOMY	101.71	31.42	115.00	(7)	14.14	4.88	15.00	(7)

Results of T-TESTS

	JOB SATISFACTION	EFFECTIVENESS
Groups 1 & 2	.126 NS	.297 NS
Groups 3 & 4	.001 SIG	.043 SIG
Groups 5 & 6	.027 SIG	.417 NS
Groups 7 & 8	.218 NS	.072 NS
Groups 1 & 3	.001 SIG	.006 SIG
Groups 2 & 4	.100 NS	.824 NS
Groups 5 & 7	.082 NS*	.223 NS
Groups 6 & 8	.080 NS	.142 NS
Groups 1 & 5	.237 NS	.855 NS
Groups 2 & 6	.741 NS	.907 NS
Groups 3 & 7	.044 SIG	.178 NS
Groups 4 & 8	.657 NS	.166 NS

* Median Test significant at .05 level

Table 4-15

The Effect of Cohesiveness and Work-Task Autonomy upon Job Satisfaction and Effectiveness Under Conditions of Danger as Perceived by Respondents' Supervisors

HIGH DANGER		JOB SATISFACTION			N	EFFECTIVENESS			N
		MEAN	SD	MEDIAN		MEAN	SD	MEDIAN	
LOW COHESIVENESS	LOW AUTONOMY	113.57	28.89	103.25	(21)	16.19	5.12	16.75	(21)
HIGH COHESIVENESS	LOW AUTONOMY	140.00	23.93	125.50	(11)	17.62	3.40	18.00	(13)
HIGH COHESIVENESS	HIGH AUTONOMY	137.11	33.60	142.00	(9)	18.77	3.37	19.25	(13)
LOW COHESIVENESS	HIGH AUTONOMY	96.88	25.62	96.50	(8)	16.70	3.43	17.00	(10)
LOW DANGER									
LOW COHESIVENESS	LOW AUTONOMY	119.75	28.27	103.50	(4)	15.57	3.41	15.75	(7)
HIGH COHESIVENESS	LOW AUTONOMY	119.20	32.86	124.00	(5)	17.25	2.05	17.50	(8)
HIGH COHESIVENESS	HIGH AUTONOMY	133.33	35.62	134.00	(10)	18.75	2.99	19.50	(12)
LOW COHESIVENESS	HIGH AUTONOMY	115.60	38.87	110.00	(10)	15.82	4.99	15.75	(11)

Results of T-TESTS

	JOB SATISFACTION	EFFECTIVENESS
Groups 1 & 2	.014 SIG	.337 NS
Groups 3 & 4	.014 SIG	.165 NS
Groups 5 & 6	.979 NS	.283 NS
Groups 7 & 8	.314 NS	.111 NS
Groups 1 & 3	.090 NS*	.086 NS
Groups 2 & 4	.002 SIG	.532 NS
Groups 5 & 7	.486 NS	.065 NS
Groups 6 & 8	.855 NS	.406 NS
Groups 1 & 5	.710 NS	.721 NS
Groups 2 & 6	.255 NS	.762 NS
Groups 3 & 7	.820 NS	.988 NS
Groups 4 & 8	.238 NS	.641 NS

* Median Test significant at .01 level

work-task autonomy are more satisfied with their jobs and effective than those in a condition of low group cohesiveness and high work-task autonomy. The fact that a high level of group cohesiveness is only contained in the condition having the higher satisfaction and effectiveness scores indicates that high levels of group cohesiveness have greater impact than high levels of work-task autonomy upon job satisfaction and effectiveness in a situation of high danger.

Although it appears that group cohesiveness has greater impact than work-task autonomy in a high danger situation, a particular pattern of interest also exists. Here, in spite of the fact that relatively low mean satisfaction and effectiveness scores are recorded in a condition of low cohesiveness and high work-task autonomy, an increase in satisfaction and effectiveness levels of some import occurs in the move from a condition of high cohesiveness and low work-task autonomy to a condition of high cohesiveness and high work-task autonomy. A mean job satisfaction score of 144.25 in the latter condition contrasts with a mean satisfaction score of 127.89 in the former condition. In similar fashion, a mean effectiveness score of 19.75 in a condition of high cohesiveness and high work-task autonomy contrasts with a mean effectiveness score of 17.57 in a condition of high cohesiveness and low work-task autonomy. These results, coupled with the existence of low satisfaction and effectiveness scores in a condition of low cohesiveness and high work-task autonomy, may suggest that, in a situation of high danger, work-task autonomy may have greater impact in conjunction with high levels of group cohesiveness rather than with low levels of group cohesiveness.

Earlier, mention was made of the importance, in high danger situations, of concentration and continuity for maintaining high levels of satisfaction and effectiveness. A great deal of work-task autonomy would allow concentration and continuity to be maintained, but as can be seen in Table 4-14, this is not sufficient to ensure high levels of satisfaction and effectiveness. It is not inconceivable that the lack of strong group ties may, despite a high level of work-task autonomy, result in an uncomfortable psychological state that may, in turn, be reflected in lowered satisfaction and effectiveness scores. In high danger situations, it would appear that both high levels of work-task autonomy and group cohesiveness are necessary for high levels of satisfaction and effectiveness. A worker may require the freedom to perform the tasks demanded by his job and yet also require the support of the group.

In a situation of low danger in Table 4-14, the pattern noted in the high danger situation reoccurs in the case of effectiveness, but not in the case of job satisfaction. The results in the case of effectiveness are not as striking as those in a situation of high danger with a mean effectiveness score of 18.29 contrasting with a mean score of 19.75. The same pattern is evidenced however, suggesting that a high level of group cohesiveness and work-task autonomy may also be an important influence on effectiveness in a situation of low danger.

When the effect of group cohesiveness and work-task autonomy upon job satisfaction in a situation of *low danger* is examined, certain significant relationships appear. Here, *those in a condition of high group cohesiveness and low work-task autonomy are more satisfied with their jobs than are those in a condition of low cohesiveness and low work-task autonomy*. The existence of this relationship serves to point out the importance of group cohesiveness in a low danger situation. When medians are compared, *those in a condition of high group cohesiveness and high work-task autonomy are more satisfied with their jobs than are those in a condition of low group cohesiveness and low work-task autonomy*. Even though a significant relationship exists between these two conditions, the highest mean satisfaction score was not recorded in a condition of high group cohesiveness and high work-task autonomy, but in a condition of high cohesiveness and low autonomy. This suggests that in a situation of low danger, a high level of work-task autonomy has relatively little positive impact upon job satisfaction. Obviously, a great deal of concentration would not be necessary in order to cope with danger, if danger was not present. Interference from others would not have the same consequences. In fact, if the discussion on risk conditions in chapter 3 is recalled, the vast majority of underground workers in a low risk situation are relatively inexperienced; and, if this researcher's personal experience is an accurate assessment of the situation, these inexperienced workers may desire interference from others, when doing their jobs, in order to learn the skills necessary for effective performance.

When those in situations of high and low danger are compared, only one significant relationship occurs. Here, those in a situation of high danger and possessing high levels of group cohesiveness and work-task autonomy are more satisfied with their jobs than are those possessing high levels of group cohesiveness and work-task autonomy in a low danger situation. The existence of this relationship serves to reinforce the notion previously advanced that both high levels of group cohesiveness and work-task autonomy are important in high danger situations.

In Table 4-15, the same significant relationships that occurred in Table 4-14 do not reoccur in the case of effectiveness. In spite of the absence of significant relationships, the same pattern observed in Table 4-14 reoccurs in Table 4-15. Here, in both high and low danger situations, the highest mean effectiveness scores are registered in a condition of high group cohesiveness and high work-task autonomy. The next highest effectiveness scores are found in a condition of high cohesiveness and low work-task autonomy. Of the remaining conditions, higher mean effectiveness scores are found in a condition of low cohesiveness and high work-task autonomy rather than in a condition of low cohesiveness and low work-task autonomy. A noticeable difference occurs when high and low danger situations are compared. Here, a median effectiveness score of 15.75 is recorded in a low danger situation by those possessing low cohesiveness and high work-task autonomy in contrast to a median effectiveness score of 17.00 registered by those possessing low cohesiveness and high work-task autonomy in a high danger situation. This difference suggests that work-task autonomy of, and by itself, has no dramatic impact in a low danger situation. What is also somewhat reconfirmed, based simply on the ordering of conditions containing high effectiveness scores is the importance of high levels of group cohesiveness for increased effectiveness in high, as well as low danger.

When the effect of group cohesiveness and work-task autonomy upon job satisfaction is examined in Table 4-15, many of the same significant relationships found in Table 4-14 reoccur in a high danger situation. Without reiterating these results, the overall importance of group cohesiveness is again reconfirmed and the tendency exists, if medians are considered, for high levels of group cohesiveness and work-task autonomy to act in concert to increase satisfaction levels.

When the effect on job satisfaction is evaluated in a low danger situation between Table 4-14 and Table 4-15, some startling differences occur. Unlike the results found in Table 4-14, those in a condition of high cohesiveness and high work-task autonomy in Table 4-15 evidence the highest job satisfaction scores and, if mean scores are considered, those in a condition of low cohesiveness and low work-task autonomy record the next highest satisfaction scores. Median scores, however, reveal a somewhat different trend. Here, those possessing high levels of group cohesiveness and work-task autonomy also have the highest job satisfaction score, but those possessing high group cohesiveness and low work-task autonomy have the next highest job satisfaction score. When it is considered that only four respondents are found in the low cohesiveness/low work-task autonomy category and only five respondents are found in the high cohesiveness/low work-task autonomy category, it is not surprising that startling differences occur between means and medians in the various categories. With such few respondents, a single high or low score may greatly distort the mean. It would appear that the more appropriate measure of central tendency in instances such as this would be the median.

Even when medians are used as a basis of comparison, a startling difference still exists between Table 4-14 and Table 4-15. This concerns the comparatively low score recorded in a condition of high cohesiveness and high autonomy in Table 4-14 versus a comparatively high score in the same category in Table 4-15. What is also of concern is the comparatively high score recorded in a condition of high cohesiveness and low work-task autonomy in Table 4-14 versus a comparatively low score recorded in the same category in Table 4-15. This discrepancy must, of course, be attributed to differences between the supervisor's perceptions of danger and the respondents' perceptions of danger.

In Table 4-14, fifty-two (52) respondents are found in a situation of high danger and forty-two (42) respondents are found in a low danger situation. In Table 4-15, forty-nine (49) respondents are found in a high danger situation and only twenty-nine (29) respondents are found in a low danger situation. Earlier, mention was made of the fact that two supervisors in the mill refused to fill out rating forms and mill supervisors, in general, considered their men to be working in dangerous conditions even though not all these mill operators considered their jobs to be dangerous. These factors may, no doubt, have bearing on the results in Table 4-15, for miners in this table now constitute a greater proportion of those in a low danger situation and miners, in general, evidence higher job satisfaction scores than do mill operators. This latter point may be particularly operative in a low danger situation when those in a condition of high cohesiveness and high work-task autonomy are considered. The discrepancy between the results in Table 4-14 and Table 4-15 between those in a situation of low danger and in a condition of high cohesiveness and low work-task autonomy may be attributed to the removal or transfer of mill operators out of the affected categories when different measures of danger are employed.

Although discrepancies exist between Table 4-14 and Table 4-15 which may be attributed to differences between mill operators and their supervisors in regard to perceptions of danger, certain tentative generalizations about the effect of group cohesiveness and work-task autonomy upon job satisfaction and effectiveness may be made. First, group cohesiveness appears to be the single most important influence on job satisfaction and effectiveness - especially in a high danger situation. Second, work-task autonomy appears to have greatest impact on job satisfaction and effectiveness when it is found in conjunction with high levels of group cohesiveness, but little overall influence by itself.

These generalizations once again underline the importance of group cohesiveness for coping with danger and suggest that work-task autonomy may, if it is found with high levels of group cohesiveness, be of some import as well.

To date, the effects of group cohesiveness and the measures of non-work-task and work-task autonomy on job satisfaction and effectiveness have been examined. The combined effects of group cohesiveness and total autonomy upon job satisfaction and effectiveness have not, as yet, been investigated. This will be the next subject of inquiry.

The Effect of Cohesiveness and Total Autonomy Upon Job Satisfaction and Effectiveness

Both Table 4-16 and Table 4-17 consider the effect of group cohesiveness and total autonomy upon job satisfaction and effectiveness. The only difference between these two tables concerns the measure of danger employed. In Table 4-16, danger is computed according to how the

Table 4-16

The Effect of Cohesiveness and Total Autonomy upon Job Satisfaction and Effectiveness Under Conditions of Danger as Perceived by Respondents

HIGH DANGER		JOB SATISFACTION			N	EFFECTIVENESS			N
		MEAN	SD	MEDIAN		MEAN	SD	MEDIAN	
LOW COHESIVENESS	LOW AUTONOMY	96.94	33.60	99.0	(17)	14.79	3.89	14.83	(14)
HIGH COHESIVENESS	LOW AUTONOMY	131.67	12.96	125.5	(6)	18.17	1.94	18.17	(6)
HIGH COHESIVENESS	HIGH AUTONOMY	137.73	22.26	138.0	(11)	19.11	2.32	19.75	(9)
LOW COHESIVENESS	HIGH AUTONOMY	106.00	33.39	115.0	(9)	16.29	4.50	17.75	(7)
LOW DANGER									
LOW COHESIVENESS	LOW AUTONOMY	87.44	37.42	92.0	(9)	14.11	5.42	14.00	(9)
HIGH COHESIVENESS	LOW AUTONOMY	126.13	39.49	122.5	(8)	16.77	3.90	17.25	(13)
HIGH COHESIVENESS	HIGH AUTONOMY	125.31	34.93	120.5	(16)	18.72	2.87	18.50	(18)
LOW COHESIVENESS	HIGH AUTONOMY	122.58	28.14	124.0	(17)	18.00	3.90	18.00	(19)

Results of T-TESTS

	JOB SATISFACTION	EFFECTIVENESS
Groups 1 & 2	.002 SIG	.019 SIG
Groups 3 & 4	.030 SIG	.169 NS
Groups 5 & 6	.057 NS*	.227 NS
Groups 7 & 8	.808 NS	.524 NS
Groups 1 & 3	.001 SIG	.003 SIG
Groups 2 & 4	.061 NS	.345 NS
Groups 5 & 7	.024 SIG	.038 SIG
Groups 6 & 8	.825 NS	.389 NS
Groups 1 & 5	.533 NS	.751 NS
Groups 2 & 6	.719 NS	.312 NS
Groups 3 & 7	.270 NS	.709 NS
Groups 4 & 8	.225 NS	.393 NS

*Median Test significant at .05 level

Table 4-17

The Effect of Cohesiveness and Total Autonomy upon Job Satisfaction and Effectiveness Under Conditions of Danger as Perceived by Respondents' Supervisors

		JOB SATISFACTION			N	EFFECTIVENESS			N
		MEAN	SD	MEDIAN		MEAN	SD	MEDIAN	
HIGH DANGER									
LOW COHESIVENESS	LOW AUTONOMY	100.38	29.96	92.50	(16)	14.75	4.70	14.17	(16)
HIGH COHESIVENESS	LOW AUTONOMY	137.00	22.50	125.50	(8)	17.09	4.09	18.00	(11)
HIGH COHESIVENESS	HIGH AUTONOMY	139.82	32.62	146.00	(11)	19.00	2.59	19.25	(15)
LOW COHESIVENESS	HIGH AUTONOMY	119.54	23.81	115.00	(13)	18.07	3.92	18.00	(15)
LOW DANGER									
LOW COHESIVENESS	LOW AUTONOMY	103.40	37.09	101.00	(5)	14.00	4.08	15.25	(7)
HIGH COHESIVENESS	LOW AUTONOMY	114.00	40.82	115.00	(5)	17.38	2.45	17.50	(8)
HIGH COHESIVENESS	HIGH AUTONOMY	136.22	29.27	134.00	(9)	18.67	2.84	18.50	(12)
LOW COHESIVENESS	HIGH AUTONOMY	124.22	33.82	124.00	(9)	16.82	4.31	16.25	(11)

Results of T-TESTS

	JOB SATISFACTION	EFFECTIVENESS
Groups 1 & 2	.004 SIG	.182 NS*
Groups 3 & 4	.104 NS*	.449 NS
Groups 5 & 6	.679 NS	.085 NS
Groups 7 & 8	.433 SIG	.245 NS
Groups 1 & 3	.005 SIG	.004 SIG
Groups 2 & 4	.111 NS	.547 NS
Groups 5 & 7	.132 NS	.026 SIG
Groups 6 & 8	.648 NS	.726 NS
Groups 1 & 5	.873 NS	.705 NS
Groups 2 & 6	.292 NS	.853 NS
Groups 3 & 7	.798 NS	.756 NS
Groups 4 & 8	.726 NS	.457 NS

* Median Test significant at .05 level

respondents perceive it. In Table 4-17, danger is computed according to how the respondents' supervisors perceive it.

In a *high danger* situation in Table 4-16, a consistent trend is evidenced in the case of both job satisfaction and effectiveness. Here, the highest mean satisfaction and effectiveness scores are found in a condition of high cohesiveness and high autonomy. The next highest mean satisfaction and effectiveness scores are found in a condition of high cohesiveness and low autonomy. Of the remaining two conditions, those in the low cohesiveness/high autonomy category record higher mean satisfaction and effectiveness scores than do those in the low cohesiveness/low autonomy category.

A series of significant relationships emerge in the high danger situation in a form very similar to those found when Table 4-14 was examined. In essence, *these relationships serve to underline once again the importance of high levels of group cohesiveness for increasing job satisfaction and effectiveness in a high danger situation*. What is also reveal~~ed is~~ the *relative unimportance of high levels of total autonomy for increasing job satisfaction and effectiveness if low levels of group cohesiveness are also present*. However, if high levels of group cohesiveness are present, high levels of total autonomy have greater impact on satisfaction and effectiveness.

Therefore, it appears that in a high danger situation, maximum increases in satisfaction and effectiveness occur if high levels of group cohesiveness and total autonomy are present together.

In a low danger situation in Table 4-16, the pattern observed earlier does not reoccur. Although the highest mean effectiveness score is found in a condition of high cohesiveness and high autonomy, the next highest effectiveness score is found in a condition of low cohesiveness and high autonomy rather than in a condition of high cohesiveness and low autonomy as was the case in a high danger situation. This would suggest that high levels of total autonomy have greater impact upon effectiveness in a low danger situation. The one significant relationship that does occur involves a comparison of those in a condition of low cohesiveness and low autonomy and those in a condition of high cohesiveness and high autonomy with respondents in the latter category being judged to be more effective.

When the effect upon job satisfaction is considered in Table 4-16, little mean or median difference exists between the latter three categories. A high mean job satisfaction score of 126.13 is recorded in a condition of high cohesiveness and low autonomy with the lowest of the three scores, at 122.5, found in a condition of low cohesiveness and high autonomy. When medians are considered, the highest job satisfaction score is found in a condition of low cohesiveness and high autonomy with the lowest score, of the three categories considered, found in a condition of high cohesiveness and high autonomy. Such significant relationships that do exist concern a comparison of those in the latter three categories with those in a condition of low cohesiveness and low autonomy. With a mean job satisfaction score of 87.44 recorded in that condition, such significant relationships come as no surprise.

What these results in Table 4-16 may be revealing is the importance of total autonomy, of and by itself, in a low danger situation. What may be important in such a situation is a balance of work-task and non-work-task autonomy rather than a high level of one and a low level of another.

Despite the differeing patterns between those in a high danger situation and those in a low danger situation, no significant differences exist between those in equivalent conditions. What has been observed is a tendency in a high danger situation for high levels of total autonomy to increase satisfaction and effectiveness levels. What has also been observed is a tendency for total autonomy to be much more salient in a low danger situation than were non-work-task or work-task autonomy. The question that naturally arises concerns whether these same tendencies will be evidenced when the supervisors' perceptions of danger are employed as a control condition. Table 4-17 provides the answer.

In Table 4-17, the same pattern reoccurs when the effect on job satisfaction in a high danger is considered. Here, the highest job satisfaction scores are found in a condition of high cohesiveness and high autonomy with the next highest satisfaction scores found in a condition of high cohesiveness and low autonomy. Of the remaining two conditions, the highest satisfaction scores are found in a condition of low cohesiveness and high autonomy. The same significant relationships that were found in Table 4-16 reoccur when the effect of total autonomy and group cohesiveness upon job satisfaction is considered in a high danger situation; reconfirming the importance of group cohesiveness and establishing, if medians are considered, that high levels of total autonomy and group cohesiveness act in concert to increase job satisfaction levels.

In a high danger situation, those in a condition of high cohesiveness and high autonomy again have the highest mean effectiveness scores, but unlike the results in Table 4-16, where those in a condition of high cohesiveness and low autonomy recorded the next highest effectiveness scores, those in a condition of low cohesiveness and high autonomy in Table 4-17 register the next highest mean effectiveness scores. By now, the reader is no doubt quite familiar with the idea that differences in perceptions of danger between the mill operators and their supervisors account for much of the difference between results found in tables employing the respondents'perceptions of danger as a control and results found in tables employing the supervisors' perceptions of danger as a control. Crucial to the position advocated was the fact that mill supervisors regarded the environment faced by mill operators as more dangerous than did the mill operators themselves and consequently, those mill operators in a low danger situation in one table would now be found in a high danger situation in another table. Differences in effectiveness scores between Table 4-16 and Table 4-17 may be accounted for by this explanation. For example, in Table 4-16, thirty-six (36) respondents consider themselves to be in a high danger situation and fifty-nine (59) respondents consider themselves to be in a low danger situation. In Table 4-17, the situation is reversed with fifty-seven (57) respondents judged by their supervisors to be in a high danger situation and thirty-eight (38) respondents judged by their supervisors to be in a low danger situation. Exactly where these respondents have gone can be seen in a comparison of the various categories in Table 4-16 and Table 4-17. For example, in a low danger situation in Table 4-16, there are nineteen (19) respondents in a condition of low cohesiveness and high autonomy when effectiveness is considered, but only eleven (11) respondents in the equivalent category in Table 4-17. In a situation of high danger in Table 4-16, there are seven (7) respondents in a condition of low cohesiveness and high autonomy, but fifteen (15) respondents are found in the equivalent category in Table 4-17. In the move from Table 4-16 to Table 4-17, an increase of eight respondents in the low cohesiveness/high autonomy category was observed in a situation of high danger and a decrease of eight respondents in the equivalent category in a situation of low danger. The results are identical for all other categories concerned with changes in effectiveness scores.

To solidify this explanation, it can easily be seen that in a situation of high danger, those in the low cohesiveness/high autonomy category in Table 4-17 record higher effectiveness scores than do those in identical circumstances in Table 4-16. Consistent with these results are the results found in a low danger situation. Here, those in the low cohesiveness/high autonomy category in Table 4-17 record lower effectiveness scores than do those in identical circumstances in Table 4-16. A decrease in one category is reflected in an increase in another.

Unlike the situation found in Table 4-16 the pattern found in a low danger situation in Table 4-17 is not comparable. Here, the second highest effectiveness scores are found in a condition of high cohesiveness and low autonomy rather than in a condition of low cohesiveness and high autonomy. The lack of a pattern observed in the consideration of job satisfaction in Table 4-16 disappears and is replaced by a clearly discernible one. Here, the highest job satisfaction scores are recorded in a condition of high cohesiveness and high total autonomy with the next highest satisfaction scores registered in a condition of low cohesiveness and high total autonomy. Of the two remaining conditions, those in a condition of high cohesiveness and low total autonomy record the higher satisfaction scores. What results of this nature may suggest is the importance, in a low danger situation, of high levels of total autonomy for increasing job satisfaction. Another factor of importance may be the discovery of group cohesiveness and total autonomy acting together to increase satisfaction levels under a condition perceived by respondents' supervisors to be low in danger. This brings up an interesting point. Throughout this chapter, a discrepancy has been pointed out between the mill operators' perceptions of danger and their supervisors' perceptions of danger. Drawing upon the work of Gouldner (1954), an explanation to account for why mill supervisors would find the environment more dangerous than the mill operators themselves was proposed, but an aspect of that question was left unexplored. Although a discrepancy existed between mill operators and their supervisors, virtually no difference was found between miners and their supervisors. What may be operative in this instance is the amount of danger present in the situation itself. A situation may be so obviously dangerous that a consensus about the danger present must exist, but another situation may be somewhat less obviously dangerous and therefore, subject to diverse interpretations. If mill operators and their supervisors can be though of as constituting two distinct groups, it would appear that a consensus exists within the grups themselves, but not between the groups.

Although generalizations are difficult to make about the effects of total autonomy and group cohesiveness upon job satisfaction and effectiveness under varying conditions of danger, it does appear that group cohesiveness is the single most important factor for increased job satisfaction and effectiveness in a high danger situation. Total autonomy does have some impact in a high danger situation, but achieves best results in conjunction with group cohesiveness. It does appear, however, that total autonomy has its singularly greatest effect upon job satisfaction (when the effect of cohesiveness is controlled) in a low, rather than high, danger situation.

Summary

In this chapter, an attempt was made to discover and analyze the structure of relationships between the major independent and dependent variables in this study. In the course of this endeavour, some interesting results were noted. Among these results, was the finding that underground miners were significantly more satisfied with their jobs than were mill operators. Also of interest was the discovery that mill operators and their supervisors did not share a common perception of how dangerous working conditions actually were. The explanation proposed, suggested that the actual danger present in the mill may have been of such a quality that diverse interpretations of it were possible and other factors, rather than the stimulus itself, may have affected perceptions of its existence.

An additional finding worthy of mention, concerned the relative lack, and in some instances, the negative, impact of non-work-task autonomy upon the dependent variables in a high danger situation. It was suggested that since non-work-task autonomy refers to the freedom an individual enjoys, from others, when not performing work-task requirements, great amounts of non-work-task autonomy may be akin to social isolation. This social isolation may prevent the individual from drawing upon the social supports in the environment to aid him in coping with danger. In such a situation, lowered job satisfaction and effectiveness scores would be the logical result.

Although these diverse, and sometimes serendipitous, findings are worthy of mention, the dominant theme that emerges in this chapter concerns the overall importance of group cohesiveness - irregardless of the element of danger. With regard to the specific problem of coping with danger, it appears that work-task and total autonomy may operate successfully in conjunction with group cohesiveness, but group cohesiveness is the single most important factor.

Although consistency is the hallmark of the results found for the effects of group cohesiveness, such cannot be said about the effects of autonomy. Of the three measures of autonomy, only total autonomy appears to have positive impact on job satisfaction and effectiveness-irregardless of how danger is perceived. Obviously, additional clarification is necessary.

One of the best means of providing clarification is through correlational analysis. Instead of examining the structure of relationships as was done in this chapter, correlational analysis provides an indication of the strengths of these relationships. If relationships are weak and insignificant, then no generalizations can be made about them, and this discovery is perhaps the best clarification of all.

In the next chapter, an attempt will be made, through correlational analysis, to discover the strengths of relationships outlined in the model in chapter 2 and, by so doing, provide the required clarification.

Notes

1. Stopes and headings are mining terms. A heading is a major passageway often linking one level to another or extending the sphere of mining operations. Those actually creating headings are generally known as development miners whose principle task it is to extend these passageways. This is done by drilling and blasting. Depending on the width of the passage desired, as many as 56 12 foot holes may be drilled and loaded with explosives and then hooked up via lead wire to a blasting box. After the blast is over the following shift will remove the broken rock and secure the environment (see below for a discussion). If time remains new holes will be drilled and the cycle will continue.

   Between two passageways mineral bearing rock may be found and inside a small opening a large room-like area may be found. This area is called a stope. A stope miner is responsible for securing the environment by careful removal of loose rock (scaling) and the driving of bolts into the ceiling and walls. The stope miner is also responsible for removing the mineral bearing rock. This may involve the use of an electric motor that enables by the use of wire cable and a series of blocks (winches) a scraper (shaped somewhat like a small bucket on a steam shovel) to be drawn back and forth pushing the rock to the desired opening. The drilling and blasting of solid rock (benches) may also be required.

2. Although not reported in tabular form in the text of this chapter, those in a high risk situation recorded higher levels of autonomy and group cohesiveness than did those in a low risk situation. In the high-risk group, respective mean scores for Non-Work-Task

and Work-Task Autonomy were 10.23 and 11.62 in comparison to 9.93 and 11.47 for the low risk group. In the high-risk group, respective mean scores for Total Autonomy and Group Cohesiveness were 21.85 and 6.38 in comparison to 21.40 and 6.17 for the low risk groups.

3. Although similarities between miners and mill operators exist, the following is a synopsis of their differences. Unless otherwise noted, these differences reflect trends and are in no way to be considered as gospel. Unfortunately, due to the relatively small sample of mill operators available and the lack of complete data on some respondents, the generation of conclusive evidence in this study becomes impossible. Here, nevertheless, are some of these differences.
    - a) Miners are significantly more satisfied than mill operators with their jobs - irregardless of the element of danger.
    - b) High levels of group cohesiveness appear to have greater impact on miners' job satisfaction and effectiveness levels than on mill operators' - irregardless of the element of danger.
    - c) Non-work-task autonomy has a negative impact on mill operators' effectiveness levels in a high danger situation, but a positive impact on miners' effectiveness levels.
    - d) Non-work-task autonomy has a negative impact on mill operators' satisfaction levels in a low danger situation, but a positive impact on miners' satisfaction levels.
    - e) Work-task autonomy has a positive impact on miners' satisfaction and effectiveness levels in a high danger situation, but a negative impact on mill operators' satisfaction and effectiveness levels.
    - f) Work-task autonomy has a slightly negative impact on miners' satisfaction levels in a low danger situation, but a positive impact for mill operators.
    - g) Total autonomy has greater impact on miners', rather than mill operators', satisfaction levels - irregardless of the element of danger.
    - h) Unlike miners and their supervisors, mill operators and their supervisors do not share a common perception of the danger present. Thirty-eight percent of the mill operators consider themselves to be working in a dangerous environment, but their supervisors regard

sixty percent of them as working in a dangerous environment.

Obviously unless differences are noted, the results for both miners and mill operators are consistent with each other, and with the material presented in the text of this chapter.

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Chapter 5

A Summary of Associations

Introduction

In Chapter 4, emphasis was placed on discovering the pattern of relationships that emerged between the major independent and dependent variables in this study. Of special concern was the form these relationships took under different conditions of danger. In Chapter 5, the focus of analysis shifts from discovering the existence of relationships, to evaluating these relationships according to the strength and significance of their correlations. While in Chapter 4, attention was directed only toward the major independent and dependent variables; the scope of analysis, in Chapter 5, broadens to include consideration of off-the-job contact and hypothesized relationships between independent variables. Consistent with Chapter 4, however, will be the special attention accorded these various relationships under different conditions of danger.

Although a similar emphasis exists between Chapter 4 and Chapter 5, only the respondents' perceptions of danger will be used to constitute the control condition of danger in this chapter. W. I. Thomas provides the theoretical justification for this strategy by maintaining that "if men define situations as real, they are real in their consequences" (Bulmer,1978:299), but certain practical considerations also arise. This involves the fact that fewer respondents are available when the supervisors rate the severity of danger and, as can be seen throughout Chapter 4, wherever a small number of respondents is found in a particular category, wild fluctuations in measures of central tendency may occur. When correlational analysis is attempted, a small number of respondents may make the computation of a correlation virtually impossible and an accompanying test of significance meaningless.

In Chapter 4, it was difficult to find an overall consistent trend between the various measures of autonomy and job satisfaction whether the effects of danger were controlled, or not. It would be interesting to discover if some clarification of these relationships can be made through correlational analysis and, therefore, the relationship between autonomy and job satisfaction becomes the first subject of inquiry.

Autonomy and Job Satisfaction

The format for this, and subsequent sections, each corresponding to a table in the text, will see a general discussion of the relationship(s) outlined without controls; followed by an examination of the relationship(s) under conditions of high and low danger. A synopsis will encapsule the pertinent results in the section and evaluate the hypotheses outlined in Chapter 2.

The General Relationships Between Autonomy and Job Satisfaction

In Table 5-1, no significant relationship exists between the three measures of autonomy and job satisfaction without instituting control conditions. What is observed, however, is a tendency for non-work-task and total autonomy to be more highly correlated with job satisfaction than is the case with work-task autonomy. This suggests, of course, that high levels of non-work-task and total autonomy may be more likely to be reflected in high levels of job satisfaction, but the evidence is far from conclusive. Whether or not, these results will reoccur under different conditions of danger becomes the question addressed when the relationship between autonomy and job satisfaction is examined under conditions of high and low danger.

Table 5-1

Summary of Crosstabulations Performed to Evaluate an Expected Positive Relationship Between Autonomy and Job Satisfaction

Dependent Variable	Independent Variables					
Job Satisfaction	Non-Work-Task	N	Work-Task	N	Total Autonomy	N
	Tau C = .1080	(93)	Tau C = .0338	(93)	Tau C = .1009	(93)
	sig = .1516		sig = .6629		sig = .1695	
Controlling for Danger						
High Danger	Tau C = .1334	(51)	Tau C = .0580	(51)	Tau C = .1681	(51)
	sig = .1922		sig = .5821		sig = .0941	
Low Danger	Tau C = .1023	(42)	Tau C = .0207	(42)	Tau C = .0639	(42)
	sig = .3688		sig = .8613		sig = .5697	

The Relationships Between Autonomy and Job Satisfaction Under Different Conditions of Danger

No significant relationships between the three measures of autonomy and job satisfaction are found in a situation of high or low danger. All three measures of autonomy correlate in a slightly higher manner with job satisfaction in a situation of high, rather than low danger. The index of total autonomy demonstrates the greatest fluctuation with a correlation of approximately .06 registered in low danger. The correlation found in a high danger situation comes closest to approaching the .05 level of significance with a probability of occurring by chance approximately nine out of one hundred times.

While a wide fluctuation occurs in the correlations between total autonomy and job satisfaction in different situations of danger, such is not the case with non-work-task or work-task autonomy. Correlations between these two measures of autonomy and job satisfaction remain relatively more stable. A correlation, between non-work-task autonomy and job satisfaction, of .13 is found in high danger and a correlation of .10 is found in low danger. When correlations between work-task autonomy and job satisfaction are considered, a Tau C of approximately .06 is found in high danger and a Tau C of approximately .02 is found in low danger.

Total autonomy appears to have more influence upon job satisfaction in a high danger situation and non-work-task autonomy appears to have greater influence in a low danger situation although, it must be reiterated, these relationships are by no means significant and the variance explained is inconsequential.

Synopsis

Although total autonomy came close to having a significantly positive impact on job satisfaction in a high danger situation, the absence of any significant relationships between the measures of autonomy and job satisfaction forces acceptance of the null hypothesis that there is no relationship between autonomy and job satisfaction.

Even though there is no significant relationship between autonomy and job satisfaction, autonomy cannot be totally dismissed without evaluating its impact on effectiveness as hypothesized in Chapter 2. The next section focusses on the expected positive relationship between autonomy and effectiveness.

Autonomy and Effectiveness

The General Relationships Between Autonomy and Effectiveness

There is a striking difference between the results noted in Table 5-1 and Table 5-2. In Table 5-1, no significant relationships existed between the three measures of autonomy and job satisfaction. In Table 5-2, when the effect of these three measures of autonomy upon effectiveness is considered, two general significant relationships emerge such that, both non-work-task and total autonomy are positively correlated with effectiveness. In essence, high levels of non-work-task and total autonomy are likely to be reflected in high effectiveness ratings. There is also a tendency for high levels of work-task autonomy (Tau C = .13) to be associated with high levels of effectiveness, but this relationship is not significant. It appears, based on the results from both Table 5-1 and Table 5-2, that all three measures of autonomy are more highly correlated with effectiveness than job satisfaction. In the case of effectiveness it also appears that generally, a combination of non-work-task and work-task autonomy, reflected in the measure of total autonomy, is most salient. While a combination of non-work-task and work-task autonomy may be the most

Table 5-2

Summary of Crosstabulations Performed to Evaluate an Expected Positive Relationship Between Autonomy and Effectiveness

Dependent Variable	Independent Variables					
Effectiveness	Non-Work-Task	N	Work-Task	N	Total Autonomy	N
	Tau C = .1835	(95)	Tau C = .1257	(95)	Tau C = .1997	(95)
	sig = .0135		sig = .1002		sig = .0058	
Controlling for Danger						
High Danger	Tau C = .1421	(48)	Tau C = .1582	(48)	Tau C = .2167	(48)
	sig = .0826		sig = .1436		sig = .0362	
Low Danger	Tau C = .2212	(47)	Tau C = .0931	(47)	Tau C = .1863	(47)
	sig = .0376		sig = .4005		sig = .0745	

salient, it appears that a high level of non-work-task autonomy is more salient than a high level of work-task autonomy.

It would be most interesting to discover if these same relationships reoccur under different conditions of danger and attention is now directed to that end.

The Relationships Between Autonomy and Effectiveness Under Different Conditions of Danger

In Table 5-1, no significant relationships emerge under different conditions of danger. Here, in a situation of low danger, a significant correlation between non-work-task autonomy and effectiveness exists. High levels of non-work-task autonomy are likely to be reflected in high levels of effectiveness in a low danger situation.

In a situation of high danger, a significant correlation between total autonomy and effectiveness is found. High levels of total autonomy are likely to be reflected in high levels of effectiveness in a high danger situation. Although these were the only significant relationships found, the patterning of the correlations with work-task autonomy is also of interest. In a high danger situation a correlation of approximately .16 is found between work-task autonomy and effectiveness, but in a low danger situation the correlation becomes approximately .09. In Chapter 4, the importance of concentration and continuity for effectiveness was outlined. At that time, it was suggested that in a high danger situation, freedom while performing a job was necessary to maintain the concentration and continuity required for effective performance. Although, not significant, the results indicated here somewhat substantiate the position advanced earlier.

Also in Chapter 4, it was noted that high levels of non-work-task autonomy may be akin to social isolation and, as a result, have negative, rather than positive consequences in a high danger situation by preventing an individual from drawing upon the social supports available in the environment. The conspicuous absence of a significant relationship, in a high situation, between non-work-task autonomy and effectiveness or job satisfaction (Table 5-1), would tend to lend greater credence to this explanation.

Synopsis

In the general relationship, both non-work-task and total autonomy are significantly associated, in a positive manner, with effectiveness. When the effects of danger are controlled, however, total autonomy has a significant positive impact in a low danger situation. It does appear that total autonomy, of the three measures of autonomy, is the most important factor in coping with danger.

In the evaluation of hypotheses, some differentiation is required between the measures of autonomy. In the case of work-task autonomy, it must be concluded that no relationship exists between autonomy and effectiveness. When non-work-task and total autonomy are considered, the null hypothesis of no relationship between autonomy and effectiveness must be rejected. It does appear, in the case of non-work-task and total autonomy, that a positive relationship exists between autonomy and effectiveness.

The consistent theme that emerged in Chapter 4, concerned the overall importance of group cohesiveness for increased satisfaction and effectiveness levels - especially in a high danger situation. In the next section, concentration will be devoted toward clarifying and evaluating the effects of group cohesiveness on the dependent variables of job satisfaction and effectiveness.

Group Cohesiveness and Job Satisfaction/Effectiveness

The General Relationship Between Group Cohesiveness and Job Satisfaction/Effectiveness

In Table 5-3 two significant relationships emerge

Table 5-3

Summary of Crosstabulations Performed to Evaluate an Expected Positive Relationship Between Group Cohesiveness and Job Satisfaction/Effectiveness

Independent Variable	Dependent Variables			
	Job Satisfaction	N	Effectiveness	N
Group Cohesiveness	Tau C = .2809	(93)	Tau C = .2637	(95)
	sig = .0003		sig = .0005	
Controlling for Danger				
High Danger	Tau C = .3155	(51)	Tau C = .2659	(48)
	sig = .0019		sig = .0113	
Low Danger	Tau C = .2479	(42)	Tau C = .3218	(47)
	sig = .0329		sig = .0035	

such that group cohesiveness is positively correlated with both job satisfaction and effectiveness. High levels of group cohesiveness are likely to be reflected in high levels of both job satisfaction and effectiveness. These results are consistent with the literature (cf., Van Zelst, 1952a and b; Gross,1954; Exline,1957; Trist et.al.,1963 and Turner and Lawrence,1965) demonstrating the importance of high levels of group cohesiveness for increased job satisfaction and/or effectiveness.

The question that naturally arises concerns what effect different conditions of danger will have on these relationships. The answer to the preceding question constitutes the subject matter of the next focus of inquiry.

The Relationship Between Group Cohesiveness and Job Satisfaction/Effectiveness Under Different Conditions of Danger

All the relationships in this subdivision are significant. Regardless of the element of danger, group cohesiveness is positively associated with both job satisfaction and effectiveness. What is worthy of mention, is the fact that the relationship between group cohesiveness and job satisfaction is stronger in a situation of high, rather than low, danger. This is not true, however, when the relationship between group cohesiveness and effectiveness is considered under different conditions of danger. Here, the correlation between group cohesiveness and effectiveness is stronger in a situation of low, rather than high, danger.

In Chapter 4, when the combined effects of autonomy and group cohesiveness on the dependent variables were considered, the overall importance of group cohesiveness was confirmed. The results in Table 5-3 reconfirm the importance of group cohesiveness, but in certain instances in Chapter 4, some of the measures of autonomy also appeared to have a strong influence. When one considers the positive relationships outlined in Table 5-2 between the measures of autonomy and effectiveness, it should come as no surprise that the measures of autonomy do exert some influence on effectiveness. However, irregardless of the condition of danger, group cohesiveness still explains more of the variance in both job satisfaction and effectiveness than do the measures of autonomy.

Synopsis

All of the relationships in Table 5-3 are significant, but group cohesiveness has greater impact on job satisfaction in a high danger situation and greater impact on effectiveness in a low danger situation.

The existence of significant positive associations between group cohesiveness and the dependent variables in all control conditions, forces rejection of the null hypothesis of no association between group cohesiveness and job satisfaction/effectiveness. It would be safe to assume that high levels of group cohesiveness will be reflected in high levels of job satisfaction and effectiveness.

In Chapter 2, a positive relationship between autonomy and group cohesiveness was postulated. In the next section, emphasis will be placed on evaluating that hypothesized relationship.

Autonomy and Group Cohesiveness

The General Relationships Between Autonomy and Group Cohesiveness

In Table 5-4, two general significant relationships emerge between autonomy and group cohesiveness such that both non-work-task and total autonomy are positively associated with group cohesiveness. High levels of both non-work-task and total autonomy are reflected in high levels of group cohesiveness. High levels of work-task autonomy are positively associated (Tau C = .10) with group cohesiveness, but not significantly so. The positive tendency of these results is consistent with the

Table 5-4

Summary of Crosstabulations Performed to Evaluate an Expected Positive Relationship Between Autonomy and Group Cohesiveness

Dependent Variable	Independent Variables					
Group Cohesiveness	Non-Work-Task	N	Work-Task	N	Total Autonomy	N
	Tau C = .1635 sig = .0157	(116)	Tau C = .1010 sig = .1350	(116)	Tau C = .1574 sig = .0206	(116)
Controlling for Danger						
High Danger	Tau C = .1327 sig = .1732	(54)	Tau C =-.0903 sig = .3538	(54)	Tau C = .0394 sig = .6880	(54)
Low Danger	Tau C = .1742 sig = .0668	(62)	Tau C = .2182 sig = .0212	(62)	Tau C = .2147 sig = .0244	(62)

literature reviewed in Chapter 1 (cf.,Babychuk and Goode, 1951; Whyte,1961; Turner and Lawrence,1965 and White,1972) and it appears that autonomy may be an important factor in the development and perpetuation of group cohesiveness.

When one considers that the overall general conception of autonomy, employed in this study, refers to the amount of freedom an individual enjoys from the influence of others, it may come as a surprise that autonomy and group cohesiveness are related. A common sense notion might suggest that the influence of others might result in increased interaction and, by so doing, foster the development of group cohesiveness. The crucial point may, however, involve a question of choice. If Seashore (1954) is correct in assuming that unpleasant interaction, irregardless of its intensity and duration, would unlikely be reflected in group cohesiveness; a case could be made that the influence of others, referred to in the conceptualization of autonomy, may be regarded as interference and, therefore, unpleasant. Freedom from the influence of others, allows an individual some choice over his companions as well as the time and place of their meeting. Interaction under such circumstances may likely be pleasant and serve to foster, rather than retard, the development of group cohesiveness. With this explanation, it comes as no surprise that autonomy and group cohesiveness are positively related.

In the next section, the relationships between autonomy and group cohesiveness will be examined and evaluated under different conditions of danger.

The Relationships Between Autonomy and Group Cohesiveness Under Different Conditions of Danger

What is most striking about the results noted under this control condition is the total absence of significant relationships between any of the three measures of autonomy and group cohesiveness in a high danger situation. In fact, a slight negative correlation (Tau C = -.09) is found between work-task autonomy and group cohesiveness, suggesting that high levels of work-task autonomy may be reflected in low levels of group cohesiveness in a high danger situation.

In a low danger situation, results are dramatically different. Both work-task and total autonomy are positively correlated (both approximately .22) in a significant manner with group cohesiveness. A positive correlation of approximately .17 is evidenced between non-work-task autonomy and group cohesiveness in a low danger situation and the relationship approaches significance with the probability of occurring by chance approximately seven out of one hundred times.

In Chapter 1, it was assumed that autonomy and group cohesiveness would be positively related to each other in a high danger situation. Based on the results noted here, that assumption must be discarded. Unfortunately, no clear cut explanation exists to explain why autonomy and group cohesiveness are not positively related to each other in a high danger situation. There seem to be, however, some factors worthy of consideration. First, high levels of danger may make interaction a hazardous venture and thus act to prevent the development and perpetuation of group cohesiveness - no matter how much autonomy respondents possess. Second, those in a high danger situation may desire interference from others, rather than being allowed to take responsibility for their interaction. Third, factors other than autonomy (eg. off-the-job contact, supervision, the danger itself), may become more salient influences on the development and perpetuation of group cohesiveness. Obviously, aspects of these proposed explanations may overlap and the validity accorded to them becomes an empirical question beyond the scope of this study.

Synopsis

In the general relationship, without controlling for danger, both non-work-task and total autonomy are associated in a significant, positive manner with group cohesiveness. In a situation of high danger, not one significant relationship exists between any of the three measures of autonomy and group cohesiveness. In a low danger, both work-task and total autonomy are associated in a significant, positive manner with group cohesiveness and the relationship between non-work-task autonomy and group cohesiveness was in the predicted direction and close to being significant (p = .07).

It would appear that acceptance of the null hypothesis of no association between autonomy and group cohesiveness would be warranted in a high danger situation, but not in a low danger situation. This instance is a striking example of the importance of control conditions. Without controlling for danger, the lack of any significant relationships between autonomy and group cohesiveness in a high danger situation might have gone unrealized. Likewise, the existence of a significant relationship between work-task autonomy and group cohesiveness in a low danger situation might also have gone unrealized. These findings become of some import in coping with danger if it is realized that autonomy, as measured in this study, does not appear to significantly influence group cohesiveness in a high danger situation. Given the, by now, obvious importance of group cohesiveness for coping with danger, this finding, subject to further investigation and interpretation, could have theoretical and practical implications for organizations dealing with hazardous working conditions.

To date, most of the relationships outlined in the model in Chapter 2 have been evaluated. One relationship, however, has not been discussed. This involves the relationship between off-the-job contact and group cohesiveness.

Off-The-Job Contact And Group Cohesiveness

The General Relationship Between Off-The-Job Contact and Group Cohesiveness

In Chapter 1, considerable attention was directed to the fact that miners engaged in extensive off-the-job contact (cf.,Friedmann and Havighurst,1954; Gouldner, 1954; Trist, Higgin, Murray and Pollack,1963 and Blauner, 1974). Other researchers (French,1941; Homans,1951; Back,1951; Seashore,1954 and Lott and Lott,1961), have suggested that extensive interaction may foster the development of group cohesiveness. Extrapolating from the work of the authors noted, three forms of off-the-job contact emerged. These were: (1) Participation in activities (2) Talking about the job (3) Helping behavior. It was hypothesized that high levels of off-the-job contact would be associated with high levels of group cohesiveness.

In Table 5-5, these three forms of off-the-job contact were treated as independent variables and subjected to correlational analysis. Without examining these relationships under different control conditions, only one significant relationship emerges as significant. Participation in off-the-job activities is positively associated (Tau C = .1538) with group cohesiveness. This finding is consistent with the notion that "heightened interaction is positively related to group cohesiveness" (Seashore,1954:26). It does not appear, however, that all forms of interaction will follow this pattern for weak, insignificant correlations were found between the other two measures of off-the-job contact and group cohesiveness. Whether these results will reoccur under differing conditions of danger becomes the next focus of inquiry.

The Relationship Between Off-The-Job Contact And Group Cohesiveness Under Different Conditions of Danger

Only one significant relationship occurs in a high danger situation. Here, talking about the job is positively associated (Tau C = .27) with group cohesiveness. It appears that in a high danger situation, those who talk more about their jobs when not working, form more highly cohesive groups. This relationship does not hold in a

Table 5-5

Summary of Crosstabulations Performed to Evaluate an Expected Positive Relationship Between Off-The-Job Contact and Group Cohesiveness

Dependent Variable	Independent Variables					
Group Cohesiveness	Participation in Activities	N	Talk about Job	N	Helping	N
	Tau C = .1538 sig = .0239	(116)	Tau C = .0609 sig = .3961	(116)	Tau C = .0328 sig = .6276	(116)
Controlling for Danger						
High Danger	Tau C = .1343 sig = .1700	(54)	Tau C = .2718 sig = .0091	(54)	Tau C = .1626 sig = .0949	(53)
Low Danger	Tau C = .1486 sig = .1205	(62)	Tau C =-.0527 sig = .5928	(62)	Tau C =-.0916 sig = .3332	(62)

low danger situation. Not only is the relationship not significant, but it is not even in the predicted direction (Tau C = -.05).

Little difference exists in either a high or low danger situation when the relationship between participation in activities and group cohesiveness is examined. Both correlations are in the predicted direction, but not significant.

More striking results are noted when the relationship between helping behavior and group cohesiveness is considered. Although neither result is significant, a positive correlation (Tau C = .16) is found in a high danger situation between helping behavior and group cohesiveness, but, in a low danger situation, a negative correlation (Tau C = -.09) is found. This would tend to suggest that a greater frequency of giving or receiving aid may foster the development of group cohesiveness in a high, but not low danger situation.

Synopsis

Of the general relationships, only participation in off-the-job activities is significantly associated with group cohesiveness. When danger is controlled, no significant relationships are found in a situation of low danger and, two of the three relationships, are not even in the predicted direction. In a high danger situation, however, all the relationships are in the predicted direction, but only the relationship between talking about the job and group cohesiveness is significant.

When a hypothesized relationship such as the one between off-the-job contact and group cohesiveness is maintained, the actual evaluation of the hypothesis becomes difficult because off-the-job contact encompasses a wide variety of interactions. It would appear that specific forms of contact must be evaluated before generalizations can be made. If such is the case, then it appears that the acceptance of the null hypothesis of no association between helping behavior and group cohesiveness is merited. The acceptance of the null hypothesis does not, however, seem merited in the case of the relationship between talking about the job and group cohesiveness in a high danger situation, but does seem merited in a low danger situation. When the general result is considered in the relationship between participation in activities and group cohesiveness, it appears that the rejection of the null hypothesis of no association appears called for. The non-existence of significant relationships in different conditions of danger prompts consideration of alternative control conditions. A check on this factor, revealed the relationship between participation in activities and group cohesiveness to be strong and highly significant for miners, but not for mill operators. It appears that the participation in activities/group cohesiveness relationship is not dependent on the perception of danger, but on the occupational group.

Ultimately, in the evaluation of the hypothesized relationship between off-the-job contact and group cohesiveness, it becomes virtually impossible to formulate a generalization applicable in all instances. The relationship varies depending on the form of off-the-job contact and may be influenced by occupational grouping or perceptions of danger.

Summary

In this chapter, emphasis was placed on examining and evaluating the relationships outlined in the model presented in Chapter 2. Of all the hypothesized relationships, only the predicted positive relationship between autonomy and job satisfaction failed to meet, in all instances, the appropriate level of statistical significance. Such was not the case when the relationship between autonomy and effectiveness was examined. Both non-work-task and total autonomy were positively related to effectiveness, but only the relationship between total autonomy and effectiveness was significant in a high danger situation.

Although total autonomy appears to be of some benefit in coping with danger, it does not have the same impact as group cohesiveness which appears, in the strength and significance of its relationships with both job satisfaction and effectiveness, to be the single most important factor in coping with danger.

Given the importance of group cohesiveness for coping with danger, factors which tend to influence the development and perpetuation of group cohesiveness in a high danger situation, may also be considered, indirectly at least, to be important in coping with danger. In this study, autonomy and off-the-job contact were two factors whose influence on group cohesiveness was examined. Only one of the forms of off-the-job contact, namely, talking about the job when not at work, was significantly associated with group cohesiveness in a high danger situation. Talking about the job when not at work may, therefore, be of some importance in coping with danger.

To date, some idea of the importance of certain selected variables for coping with danger has been ascertained, but no systematic examination of the relative importance of variables has been undertaken. In the next chapter, emphasis will be placed on a systematic examination of the relative importance of selected variables. The primary goal will, of course, be the discovery of the relative importance of selected variables for coping with danger.

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Chapter 6

The Importance of Selected Predictor Variables

Introduction

To date, certain relationships have been discovered and analyzed. In this chapter, emphasis will be placed upon ascertaining the importance of certain independent variables as predictors of changes in the major dependent variables with, and without, controlling for danger. Regression analysis provides information on the amount of variance in the dependent variable explained by the action of each independent variable and, as such, offers a straightforward means of assessing the importance of a given predictor.

In this chapter, two forms of regression analysis are undertaken. These are: (1) Multiple Regression (2) Stepwise Regression. The major distinction between multiple regression and stepwise regression involves the degree to which extraneous factors can be controlled. In multiple regression, variables are entered into the regression equation according to their position on a variables list card and allowed to explain as much of the variance as they can before another variable is entered. In stepwise regression, a significance level may be specified and certain variables, unless they reach a predetermined level of significance, are not allowed to enter the equation. Also with stepwise regression, the action of a particular variable or group of variables may be controlled while the effect of another variable or group of variables is examined (cf.,Nie et al.,1975: 320-350).

In this chapter, attention will be focused upon examining not only the individual importance of a given variable, but the importance of a group or cluster of variables. These clusters are termed: (1) Contextual (2) Personal. Contextual variables, such as autonomy and group cohesiveness, are considered to be aspects of the working environment and personal variables, such as age and education, are considered to be more in the way of personal attributes. Multiple regression, by demonstrating the importance of a given variable, provides a methodological basis for the development of these clusters and stepwise regression is then used to control the effects of one variable cluster while the other variable cluster is brought into the equation.

Specific attention will be devoted to the importance of these individual variables and groups of variables for coping with danger. In addition, certain theoretical and methodological issues will be dealt with.

Throughout this study, considerable attention has been devoted toward examining the effects of autonomy and group cohesiveness upon job satisfaction and effectiveness with, and without, controlling for danger. The focus of inquiry now shifts toward a more precise examination of the relative importance of autonomy and group cohesiveness.

Autonomy and Group Cohesiveness

Throughout this section, and all subsequent sections employing danger as a control condition, only the respondents' perceptions of danger have been used. In Chapters 3 and 4, emphasis was placed upon ascertaining the comparability between the supervisors' ratings of danger and the respondents' perceptions of that danger. The supervisors' ratings of danger, although not totally comparable in certain instances, do demonstrate an overall similarity with the respondents' perceptions of danger. This fact, coupled with the small sample size available in a low danger situation, mitigates against the use of the supervisors' ratings of danger as a control condition.

Both Table 6-1 and Table 6-2 demonstrate the amount of variance in job satisfaction and effectiveness explained by autonomy and group cohesiveness. Results

Table 6-1

Regression of Group Cohesiveness and Total Autonomy Upon Job Satisfaction/Effectiveness

		Dependent Variables					
		JOB SATISFACTION			EFFECTIVENESS		
Predictor Variables	Control Conditions	Beta	N	Amount of Variance Explained	Beta	N	Amount of Variance Explained
1) Group Cohesiveness	None	.32	93	11.51%	.35	95	15.13%
Respondents' Perceptions	High Danger	.39	51	17.26%	.38	48	15.02%
	Low Danger	.32	42	10.49%	.42	47	21.00%
2) Total Autonomy	None	.07	93	.55%	.21	95	4.35%
Respondents' Perceptions	High Danger	.19	51	3.53%	.27	48	7.46%
	Low Danger	.02	42	.03%	.17	47	2.78%

Table 6-2

Regression of Group Cohesiveness, Non-Work-Task, And Work-Task Autonomy Upon Job Satisfaction/Effectiveness

		Dependent Variables					
		JOB SATISFACTION			EFFECTIVENESS		
Predictor Variables	Control Conditions	Beta	N	Amount of Variance Explained	Beta	N	Amount of Variance Explained
1) Group Cohesiveness	None	.31	92	11.51%	.36	95	15.13%
Respondents' Perceptions	High Danger	.39	51	17.26%	.41	48	15.02%
	Low Danger	.32	42	10.48%	.41	47	21.01%
2) Non-Work-Task Autonomy	None	.08	92	.65%	.16	95	3.10%
Respondents' Perceptions	High Danger	.15	51	2.60%	.10	48	2.28%
	Low Danger	.03	42	.08%	.18	47	3.06%
3) Work-Task Autonomy	None	.01	92	.01%	.11	95	1.26%
Respondents' Perceptions	High Danger	.10	51	.94%	.27	48	6.84%
	Low Danger	-.02	42	.04%	.03	47	.10%

are given when danger is controlled, and when it is not controlled. The only difference between Table 6-1 and Table 6-2 concerns the substitution of non-work-task and work-task autonomy, inclusion of all three measures of autonomy in the same regression equations would provide misleading results. Providing separate inclusions allows not only an appraisal of the importance of each index, but also may provide a means of establishing whether the singular indices of autonomy explain more or less of the variance than the total index.

In both Table 6-1 and Table 6-2, group cohesiveness, in all control conditions, explains more of the variance in job satisfaction and effectiveness than any of the three measures of autonomy. The figures recorded in Table 6-1 for group cohesiveness are virtually identical to those found in Table 6-2 with group cohesiveness explaining 11.51% of the variance in job satisfaction and 15.13% of the variance in effectiveness without controlling for danger. When danger is controlled, group cohesiveness explains 17.26% of the variance in job satisfaction and 15.02% of the variance in effectiveness in a high danger situation; and 10.48% of the variance in job satisfaction and 21.01% of the variance in effectiveness in a low danger situation. Group cohesiveness explains more of the variance in job satisfaction in a high danger situation and more of the variance in effectiveness in a low danger situation. Equating the amount of variance explained with importance, it can be maintained that the greater the amount of variance explained by a given predictor, the more important the predictor. With this position in mind, group cohesiveness becomes more important for job satisfaction in a high danger situation and more important for effectiveness in a low danger situation.

In Table 6-1, total autonomy explains .55% of the variance in job satisfaction and 4.35% of the variance in effectiveness. When danger is controlled, total autonomy explains 3.53% of the variance in job satisfaction and 7.46% of the variance in effectiveness in a high danger situation; and .03% of the variance in job satisfaction and 2.78% of the variance in effectiveness in a low danger situation. When impact on job satisfaction and effectiveness is considered, total autonomy is a more important predictor of changes in effectiveness. Total autonomy also becomes more important, for both job satisfaction and effectiveness, in a high, rather than low danger situation.

In Table 6-2, when non-work-task and work-task autonomy are substituted for total autonomy, both variables have greater impact on effectiveness rather than on job satisfaction. Non-work-task autonomy explains .65% of the variance in job satisfaction and

3.10% of the variance in effectiveness and work-task autonomy explains .01% of the variance in job satisfaction and 1.26% of the variance in effectiveness. Without controlling for danger, non-work-task autonomy is a more important predictor than is work-task autonomy. Non-work-task and work-task autonomy, when their singular effects are added together, explain .66% of the variance in job satisfaction and 4.36% of the variance in effectiveness. The results in the case of effectiveness are virtually identical to the amount of variance explained by total autonomy, but such is not the case when job satisfaction is considered. Here, the singular indices explain .11% more of the variance than does total autonomy. Although the difference is slight, the singular indices appear to have greater explanatory power.

When danger is controlled, both non-work-task and work-task autonomy explain more of the variance in job satisfaction in a high, rather than low danger situation. Non-work-task autonomy explains 2.60% of the variance in job satisfaction in a high danger situation and .08% of the variance in a low danger situation. Work-task autonomy explains .94% of the variance in job satisfaction in a high danger situation and .04% of the variance in a low danger situation. These results demonstrate that the separate indices of autonomy, when their singular effects are added together, explain the same amount of variance in job satisfaction as does total autonomy in a high danger situation, but slightly more (.12% versus .03%) of the variance in a low danger situation. It would appear that the greater explanatory power of the singular indices, although slight, occurs in a low, rather than high danger situation. Of the two measures of autonomy, non-work-task autonomy, regardless of the element of danger, is more important for job satisfaction than is work-task autonomy.

When danger is once again controlled, the same patterns observed with job satisfaction do not reoccur with effectiveness. Here, non-work-task autonomy explains 2.28% of the variance in effectiveness in a high danger situation and 3.06% of the variance in a low danger situation. Work-task autonomy explains 6.84% of the variance in effectiveness in a high danger situation and .10% of the variance in a low danger situation. Work-task autonomy is more important for effectiveness in a high danger situation and non-work-task autonomy is more important in a low danger situation.

While total autonomy explains 7.46% of the variance in effectiveness in a high danger situation and 2.78% of the variance in a low danger situation, the separate indices of autonomy, when their singular effects are added together, explain 9.91% of the variance in effectiveness in a high danger situation and 3.17% of the variance in a low danger situation. Comparing the amount of variance explained in Table 6-2 with Table 6-1, it becomes clearly evident that, in the case of effectiveness, the singular indices of non-work-task and work-task autonomy possess greater explanatory power in high and low danger situations than does total autonomy.

In general, group cohesiveness is more impor[illegible] for both job satisfaction and effectiveness than any of the three measures of autonomy. In a high danger situation, group cohesiveness explains more of the variance in job satisfaction and effectiveness than do the three measures of autonomy and thus, *group cohesiveness becomes more important in coping with danger*. Although autonomy does not appear to be as important as group cohesiveness certain considerations should be borne in mind. These are: (1) The impact of total autonomy upon job satisfaction and effectiveness is much greater in a high, rather than low danger situation. (2) Non-work-task autonomy explains four times as much of the variance in job satisfaction in a high danger situation as it does generally. (3) Work-task autonomy, by itself, explains almost seven percent (6.84%) of the variance in effectiveness in a high danger situation and yet only 1.26% generally. These factors, coupled with the results noted throughout this section, suggest that *in high danger situations different forms of autonomy may be operative, depending on whether* increased job satisfaction or increased effectiveness is the desired goal.

Throughout this thesis, mention has been made (cf., White,1967) of the potential importance of the supervisor as a means of coping with danger. The proposed explanations (see Chapter 1 in particular) have tended to stress the methods by which a supervisor may foster or prohibit the development of autonomy and group cohesiveness. Different supervisory styles may have direct effects on both job satisfaction and effectiveness that cannot be accounted for by simply assuming that supervisors foster or prohibit the development of autonomy and group cohesiveness. The extent to which different supervisory styles explain variance over and above that already accounted for by autonomy and group cohesiveness becomes the next focus of inquiry entitled:

Autonomy, Supervision and Group Cohesiveness

Although the potential importance of supervision in ability to cope with danger was noted in the literature review, supervision per se, did not constitute an aspect of the research model. Some explanations of the findings to date, have pointed out the potential impact different types of supervisory styles may have. Given this fact, and the belief that theories should be modified or changed according to the results of empirical research, it becomes necessary to investigate the importance of different supervisory styles.

Drawing upon the work of Fleishman, White (1972:20) notes that factor analysis has revealed "Initiation of Structure and Consideration" to be two salient "dimensions of supervisory behavior". Definitions of each take the following form:

> "Initiation of Structure: reflects the extent to which an individual is likely to define and structure his role and those of his subordinates toward goal attainment. A high score on this dimension characterizes individuals who play a more active role in directing group activities through planning, communicating, information, scheduling, trying out new ideas....
> Consideration: reflects the extent to which an individual is likely to have job relationships characterized by mutual trust, respect for subordinate's ideas, and considerations of feelings. A high score is indicative of a climate of good support and two-way communication. A low score indicates the supervisor is more likely to be impersonal in his dealings with group members". (White,1972:20)

In this thesis, Consideration has been relabelled Supportive Supervision. Following White (1972:274), the degree to which a supervisor may be categorized as exhibiting structure-initiating behavior has been ascertained by the following question which asks: "How good a description of your supervisor is the following statement? 'He asks group members to follow standard rules and regulations, lets workers know what is expected of them, makes his attitudes clear, and describes what shall be done.'" Available responses ranged on a five point scale from "very good description" to "very poor description". Again, following White (1972:274), the degree to which a supervisor may be categorized as exhibiting supportive (consideration) behavior has been ascertained by the following question which asks: "How good a description of your supervisor is the following statement? 'He is friendly, approachable, listens to suggestions made by the group, and generally looks out for the welfare of all workers he supervises'."

In Table 6-3, although the impression may be given, based on the order the variables are presented, that group cohesiveness is entered first, such is not the case. In actuality, supportive supervision enters the regression equation first, followed by group cohesiveness, total autonomy, and structure-initiating supervision. This may appear to create an apparent bias in favour of supportive supervision for, by entering first it may be allowed to explain variance that might well have been explained by structure-initiating supervision if that variable, instead of supportive supervision, had entered the regression equation first. In effect, this is correct. When structure-initiating supervision is the only variable in the equation, it predicts 8.85% of the variance in job satisfaction. When supportive supervision is the only

Table 6-3

Regression of Group Cohesiveness, Total Autonomy, Supportive Supervision, And Structure-Initiating Supervision Upon Job Satisfaction/Effectiveness

		Dependent Variables					
		JOB SATISFACTION			EFFECTIVENESS		
Predictor Variables	Control Conditions	Beta	N	Amount of Variance Explained	Beta	N	Amount of Variance Explained
1) Group Cohesiveness	None	.31	93	9.35%	.39	95	14.79%
Respondents' Perceptions	High Danger	.36	51	12.11%	.35	48	13.55%
	Low Danger	.35	42	11.12%	.41	47	21.26%
2) Total Autonomy	None	-.01	93	.03%	.19	95	3.44%
Respondents' Perceptions	High Danger	.05	56	.35%	.23	48	4.48%
	Low Danger	-.04	42	.12%	.17	47	2.55%
3) Supportive Supervision	None	.31	93	16.95%	.09	95	1.79%
Respondents' Perceptions	High Danger	.30	51	19.86%	.25	48	6.93%
	Low Danger	.41	42	15.60%	-.03	47	.05%
4) Structure-Initiating Supervision	None	.13	93	1.29%	-.01	95	.01%
Respondents' Perceptions	High Danger	.15	51	1.66%	-.19	48	2.98%
	Low Danger	-.01	42	.01%	.10	47	.56%

predictor variable in the equation, it predicts 16.95% of the variance in job satisfaction. When both supportive supervision and structure-initiating supervision are entered together, 17.87% of the variance in job satisfaction is explained, with structure-initiating supervision accounting for 8.84% and supportive supervision accounting for 9.03% of the variance. Interestingly enough, each variable when separately allowed to explain variance in job satisfaction is significant, but when entered together, only supportive supervision is significant. These results confirm White's (1972:21) noting of "interactions between consideration and initiation of structure". The fact that supportive supervision was a significant predictor and structure-initiating supervision was not, argues well for including supportive supervision first. This fact, coupled with the notion that some of the variance explained by group cohesiveness and autonomy may be accounted for by supervisory style also suggests that the two supervisory variables should be separated. A change of entry, where autonomy is entered into the equation followed by the two supervisory variables and group cohesiveness, reveals that the variance explained by total autonomy increases beyond the limits noted in Table 6-1 and yet the amount of variance explained by group cohesiveness remains the same as in Table 6-3. This observation suggests that:

(1) Both group cohesiveness and supportive supervision are picking up some of the variance that might otherwise have been explained by total autonomy. The fact, as evidenced in Table 6-3, that total autonomy precedes the entry of structure-initiating supervision into the regression equation and yet explains so little of the variance in job satisfaction suggests that structure-initiating supervision may not pick up variance that might otherwise be explained by total autonomy. (2) Supportive supervision is the only variable that is picking up variance that might otherwise be explained by group cohesiveness. In effect, notice must be taken of the existence of a great deal of interaction between these predictor variables and caution should be used when unilaterally declaring the importance of a single variable. To some extent, stepwise regression by considering variables in clusters, offers a way out of this dilemma.

Although caution is a necessity, certain factors about Table 6-3 are worthy of mention. (1) The inclusion of the two supervisory variables in Table 6-3 increases the amount of variance explained in job satisfaction, without controlling for danger, by approximately 16% over that explained in Tables 6-1 and 6-2, more specifically by approximately 13% in a high danger situation and by approximately 17% in a low danger situation. (2) The inclusion of the two supervisory variables in Table 6-3 increases the amount of variance explained in effectiveness generally by .50% over that explained in Tables 6-1 and 6-2, more specifically by approximately 4% in a high danger situation and .25% in a low danger situation. These results suggest that supervisory styles have a greater impact upon job satisfaction rather than on effectiveness. Interestingly enough, it appears that the greatest impact of supervisory styles is felt upon job satisfaction in a low, rather than high danger situation, in spite of the fact that supportive supervision explains 19.86% of the variance in a high danger situation and 15.60% of the variance in a low danger situation, and a similar trend is evidenced sith structure-initiating supervision. When it is considered that in Table 6-1 and 6-2, group cohesiveness explains 17.26% of the variance in job satisfaction in a high danger situation, but only 12.11% of the variance in an equivalent situation in Table 6-3, these results are not surprising for it appears that supportive supervision is picking up variance formerly explained by group cohesiveness. When it is also considered that total autonomy, in Table 6-1, explains 3.53% of the variance in a high danger situation, but only .35% of the variance in an equivalent situation in Table 6-3, it appears that the same process is operative here as well. Supportive supervision is picking up variance previously explained by total autonomy.

In the case of effectiveness, very little new variance is accounted for by the addition of two supervisory variables. The fact that supportive supervision explains 6.93% of the variance in effectiveness in a high danger situation must be partially accounted for by the tendency for it to pick up variance formerly explained by group cohesiveness and total autonomy.

Several general conclusions emerge from this discussion. They are: (1) Interaction effects are observed among many of the predictor variables in this section. (2) Supervisory styles have a direct effect upon job satisfaction as well as acting through group cohesiveness and autonomy. (3) Supervisory styles have very little direct effect upon effectiveness (except marginally in a high danger situation), but rather tend to act through group cohesiveness and autonomy. (4) Although caution should be maintained in asserting the primacy of a given variable without attention being paid to situational specifics or confounding relationships, this does not imply that supervisory styles are of no importance in predicting changes in job satisfaction or effectiveness. (5) With specific reference to the problem of coping with danger, it does appear that supportive supervision, in a high danger situation, by explaining 19.86% of the variance in job satisfaction and 6.93% of the variance in effectiveness (even considering confounding relationships), offers a potential mechanism for coping with danger. (6) Stepwise regression, by considering clusters of variables, offers a means of analysis that does not place sole emphasis upon the importance of an individual variable.

In keeping with this last point, the four variables noted in Table 6-3 will be entered together in stepwise regression analysis under the general rubric of contextual factors. Obviously, if stepwise regression analysis is to be performed, at least one other cluster of variables is required. With this in mind, attention now shifts toward examining variables falling under the general rubric of personal factors.

Status, Years-on-the-job, Age, and Education

Earlier in this thesis, reference was made to a quotation from Mechanic (1974:34) who pointed out that "the literature on stress and coping has aided the myth that adaptation is dependent on the ability of individuals to develop personal mastery over their environment" and "...it is clear that major stresses on modern man are not amenable to individual solutions, but depend on highly organized, cooperative efforts..." It would have perhaps been an interesting and potentially fruitful piece of work to examine in more detail the implications of what Mechanic is, in effect, advocating. For example, if response rates had allowed the work group to constitute the unit of analysis, differences between groups could be ascertained that might provide valuable information on the importance of the group. If reliable, easily administered psychological tests, that did not require extensive training in interpretation, were available; a comparison of the importance of group and organizational factors with personality attributes could be attempted. Unfortunately, these goals are not realized in this thesis. However, a very limited test of Mechanic's ideas are attempted through a comparison of the importance of personal and contextual factors. In the previous section, an analysis of selected personal variables will be undertaken.

In Chapter 3, certain selected characteristics of the respondents were outlined in Table 3-2. Of these characteristics, greatest variability occurred between miners and mill operators with regards to years-on-the-job, age, and education. Also in Chapter 3, reference was made to an updated version of a schemata first developed by Trist and Bamforth (1951) showing the method of payment, work-task requirements, status and group structure for both miners and mill operators (see Appendices 2 through 7). Within this schemata, a great deal of variability exists in the status rankings and, if the concept of status amongst workers may be considered to be more of a personal, than contextual attribute, it appears that four variables emerge to constitute personal factors. These variables are: (1) Years -on-the-job (2) Age (3) Education (4) Status. In both Chapter 3 and 4, emphasis was placed on the potential importance of experience as a means of coping with danger. All four of these variables may, in some manner, be considered to be related to experience. Although these variables do not constitute personality types, they are more closely allied with personal attributes than contextual factors and, as such, offer a means of comparing the relative importance of certain selected group and organizational factors with certain selected personal attributes.

In Table 6-4, what is immediately striking is the predominance of negative relationships evidenced between many of these variables and job satisfaction and effectiveness. Although some variance may be explained by the action of certain variables, it must not automatically be assumed that the relationship is positive. A high score on an independent variable may be reflected in a low score on one, or more, of the dependent variables and yet a great deal of variance may still be explained.

When Table 6-4 is examined, it does appear that without controlling for danger, age has the greatest

Table 6-4

Regression of Status, Years-on-the-Job, Age, and Education Upon Job Satisfaction/Effectiveness

			Dependent Variables					
			JOB SATISFACTION			EFFECTIVENESS		
Predictor Variables		Control Conditions	Beta	N	Amount of Variance Explained	Beta	N	Amount of Variance Explained
1) Status		None	-.13	91	1.51%	-.15	94	1.68%
	Respondents' Perceptions	High Danger	.08	50	.05%	.24	48	3.07%
		Low Danger	-.18	41	2.44%	-.26	46	3.69%
2) Years-on-the-Job		None	-.22	91	1.22%	-.11	94	-----
	Respondents' Perceptions	High Danger	-.29	50	4.99%	-.09	48	1.08%
		Low Danger	-.20	41	.31%	-.17	46	.01%
3) Age		None	.19	91	2.19%	.26	94	3.27%
	Respondents' Perceptions	High Danger	.08	50	.37%	-.11	48	.22%
		Low Danger	.26	41	3.80%	.46	46	9.04%
4) Education		None	.03	91	.08%	.10	94	.74%
	Respondents' Perceptions	High Danger	-.01	50	----	-.09	48	.52%
		Low Danger	.06	41	.28%	.26	46	4.62%

positive impact upon job satisfaction and explains 2.19% of the variance. Status and years-on-the-job are negatively associated with job satisfaction, explaining 1.51% and 1.22% of the variance respectively. In a high danger situation, three of the four variables explain only a total of .42% of the variance in job satisfaction. It is left to years-on-the-job, again negatively associated, to explain 4.99% of the variance. In a low danger situation, age is positively associated with job satisfaction and explains 3.80% of the variance. Little variance is explained by either years-on-the-job or education, but status, however, explains 2.44% of the variance.

In general, it appears that age and status explain more of the variance in job satisfaction in a low danger situation and years-on-the-job explains more of the variance in a high danger situation. It does not appear, however, that any of these variables has an appreciable positive impact upon job satisfaction in a high danger situation and only age has an appreciable positive impact in a low danger situation.

Continuing with Table 6-4, it can be seen that, without controlling for danger, age has the greatest positive impact upon effectiveness and explains 3.27% of the variance. Years-on-the-job and education explain little of the variance in effectiveness, but status, although negatively associated with effectiveness, explains 1.68% of the variance. In a high danger situation, status is positively associated with effectiveness and explains 3.07% of the variance, but years-on-the-job, although negatively associated with effectiveness, explains 1.08% of the variance. In a low danger situation, both age and education are positively associated with effectiveness with the former explaining 9.04% of the variance, and the latter explaining 4.62% of the variance. Virtually no variance is explained by years-on-the-job but status, negatively associated with effectiveness, explains 3.69% of the variance.

In general, age and education explain more of the variance in effectiveness in a low danger situation and status and years-on-the-job explain more of the variance in a high danger situation. Only status, however, has a positive impact upon effectiveness in a high danger situation. In a low danger situation, both age and education exhibit strong positive associations with effectiveness.

With reference to the specific problem of coping with danger, it appears that status, in its positive association with effectiveness and explanation of 3.07[illegible] of the variance, is the most important of the personal variables.

To date, emphasis has been placed upon discovering not only the general importance of selected personal and contextual variables for predicting changes in job satisfaction and effectiveness, but emphasis has also been placed upon discovering the specific importance of these variables in a high danger situation. What has not been attempted, however, is discovering how much of the variance could be explained by entering both personal and contextual variables into the same regression equation and following from that, discovering which of the two variable clusters explains more of the variance in job satisfaction and effectiveness and therefore, which of the variable clusters is more important. Answers to these questions will be attempted in the next section.

Personal and Contextual Factors

In this section, as has been previously noted, stepwise regression analysis will be undertaken. One cluster of variables will be entered into the regression equation first, and while the effects of this cluster are held constant, another cluster of variables will be entered into the equation and only allowed to explain variance not already accounted for by the previous cluster.

Obviously, the importance of a given cluster may be dependent upon its entry into the regression equation, especially if variables in one cluster explain the same variance that could also be explained by variables in the other cluster. In attempting to come to grips with this potential bias, the following two tables drawn from Table 6-3 and Table 6-4 are presented.

Table 6-4a

Variance Explained in Job Satisfaction

Control Conditions	Contextual Variables	Personal Variables
None	27.62%	5.00%
High Danger	33.98%	5.41%
Low Danger	26.85%	6.93%

Table 6-4b

Variance Explained in Effectiveness

Control Conditions	Contextual Variables	Personal Variables
None	20.03%	5.69%
High Danger	27.94%	4.89%
Low Danger	24.42%	17.36%

Together these tables demonstrate that contextual factors explain more of the variance in job satisfaction and effectiveness than do personal factors even when these variable clusters are entered into regression equations independently of each other. This fact, coupled with a greater number of negative betas observed between personal variables and job satisfaction and effectiveness, suggests that including personal variables in stepwise regression after contextual variables is a reasonable strategy.

In Table 6-5, stepwise regression on job satisfaction is performed for the entire sample with variables entered in the order shown in the table. Here, 27.95% of the total variance is explained by personal and contextual factors. Of the explained variance, 95.10% is accounted for by contextual factors and 4.9% is accounted for by personal factors. Contextual factors, therefore, appear to be more important predictors of changes in job satisfaction than do personal factors.

Of the contextual factors, group cohesiveness is the most important predictor, followed by structure-initiating supervision and supportive supervision. Total autonomy explains very little (.27%) of the variance in job satisfaction, but when non-work-task and work-task autonomy are substituted for it, non-work-task autonomy explains .46% and work-task autonomy explains .02%, of the variance in job satisfaction. Of the three measures of autonomy, it

Table 6-5

Stepwise Regression on Job Satisfaction

(Total Sample)

$r^2 = 27.95\%$ $p = .0000$ $n = 91$

Variables in Regression Equation	Variance Explained By Each Variable		Percentage of Total Explained Variance
1. Group Cohesiveness	11.63%	contextual**	95.1%
2. Total Autonomy*	.27%		
3. Structure-Initiating Supervision	7.91%		
4. Supportive Supervision	6.49%		
5. Status	.02%	personal	4.9%
6. Years-on-the-Job	.02%		
7. Age	1.26%		
8. Education	.09%		

* Non-work-task and work-task autonomy were substituted for Total Autonomy in the same equation with non-work-task autonomy explaining .46% and work-task autonomy .02% of the variance in Job Satisfaction

** Unless otherwise stated, contextual variables are entered in Step 1 and personal variables in Step 2

Table 6-6

Stepwise Regression on Effectiveness

(Total Sample)

$r^2 = 24.36\%$ $p = .0021$ $n = 93$

Variables in Regression Equation	Variance Explained By Each Variable		Percentage of Total Explained Variance
1. Group Cohesiveness	14.77%	contextual	83.0%
2. Total Autonomy*	4.76%		
3. Structure-Initiating Supervision	.18%		
4. Supportive Supervision	.51%		
5. Status	1.65%	personal	17.0%
6. Years-on-the-Job	.06%		
7. Age	2.41%		
8. Education	-----		

* Non-work-task and work-task autonomy were substituted for Total Autonomy in the same equation with non-work-task autonomy explaining 3.36% and work-task autonomy explaining 1.4% of the variance.

appears that non-work-task is the most important.

Of the personal variables, age is the most important predictor explaining 2.41% of the variance in effectiveness. Status, by explaining 1.65% of the variance in effectiveness, is also of importance, but years-on-the-job and education are virtually of no importance.

If personal variables could explain 5.69% of the variance in effectiveness (as in Table 6-4b) by entering the stepwise regression equation first, and assuming that 24.36% of the variance could be explained, then it appears that personal factors, if entered first, could explain approximately 23% of the variance in effectiveness. By following contextual variables, the cluster of personal variables explains 17.0% of the variance. This discrepancy, when compared to that found in the case of job satisfaction noted earlier, is not nearly of the same magnitude, suggesting that personal and contextual variables are not as highly linked when predicting changes in effectiveness as they are when predicting changes in job satisfaction. This information, coupled with the increased amount of variance explained by personal variables, also suggests that personal factors are more important predictors of changes in effectiveness than they are of changes in job satisfaction.

In this section, analysis of the importance of personal and contextual factors for explaining changes in job satisfaction and effectiveness has been undertaken. Attempts have been made to point out possible methodological problems, as well as demonstrating possible linkages between personal and contextual variables. This analysis, although a necessary starting point, does not provide specific information on the importance of contextual and personal factors for coping with danger. The next section will attempt to provide answers to that question.

Coping With Danger

In this section, stepwise regression analysis is performed on job satisfaction and effectiveness controlling for danger. Contextual variables precede personal ones and the order of entry noted in the tables is followed. Table 6-7 represents a stepwise regression performed on job satisfaction in a high danger situation and Table 6-8 represents the same regression performed in a low danger situation.

A comparison of Table 6-7 and Table 6-8 reveals some interesting points. In a high danger situation, contextual and personal factors account for 37.57% of the variance in job satisfaction, but in a low danger situation they account for only 29.54% of the variance. This suggests that, together, contextual and personal factors

Table 6-7

Stepwise Regression on Job Satisfaction

(High Danger)

$r^2 = 37.57\%$ $p = .0081$ $n = 50$

Variables in Regression Equation	Variance Explained By Each Variable		Percentage of Total Explained Variance
1. Group Cohesiveness	19.58%	contextual	91.2%
2. Total Autonomy*	2.92%		
3. Structure-Initiating Supervision	6.48%		
4. Supportive Supervision	5.25%		
5. Status	.52%	personal	8.8%
6. Years-on-the-Job	2.38%		
7. Age	-----		
8. Education	.43%		

* Non-work-task and work-task autonomy were substituted for Total Autonomy in the same equation with non-work-task explaining 2.38% and work-task explaining .58% of the variance in Job Satisfaction

Table 6-8

Stepwise Regression on Job Satisfaction

(Low Danger)

$r^2 = 29.54\%$ $p = .0234$ $n = 41$

Variables in Regression Equation	Variance Explained By Each Variable		Percentage of Total Explained Variance
1. Group Cohesiveness	10.71%	contextual	82.4%
2. Total Autonomy*	-----		
3. Structure-Initiating Supervision	4.87%		
4. Supportive Supervision	10.76%		
5. Status	.23%	personal	17.6%
6. Years-on-the-Job	.35%		
7. Age	2.37%		
8. Education	.25%		

* Non-work-task and work-task autonomy were substituted for Total Autonomy in the same equation with non-work-task autonomy explaining .025% and work-task autonomy explaining .125% of the variance in Job Satisfaction

are more important in a high danger situation. In effect, these variables appear to be more important for coping with danger.

Continuing with the comparison, it can be seen that in a high danger situation, contextual variables account for 91.2% of the explained variance in job satisfaction, but in a low danger situation, contextual variables account for only 82.4% of the explained variance. This suggests that not only are contextual variables more important generally, but are also more important in a high, rather than low danger situation.

An examination of the contextual variables in both high and low danger reveals that group cohesiveness explains 19.58% of the variance in job satisfaction in a high danger situation, but only 10.71% of the variance in a low danger situation. Group cohesiveness becomes more important in a high, rather than low danger situation. This supports the notion advanced by Mechanic (1974:34) about the importance of the group as a means of coping with danger, but this is not the sole import of what he has to say. When mention is made of "highly organized cooperative efforts", it is not beyond the realm of possibility to visualize autonomy and supervisory styles involving organization and cooperation. Autonomy, in the conceptualization adopted in this study, is highly dependent upon others (group, individuals, supervision).

For autonomy to exist, work and non-work tasks must be organized in such a fashion that individuals are able to exercise discretion without interference from others. This involves the cooperation of the individual with others and they with him. The individual must be an effective worker, and others must respect his desire to be free and he, in turn, must respect their desire to be free. A supervisor is dependent upon the men he supervises. For him to be effective, he requires their cooperation. For the men to be effective, they require his cooperation. This requires, given the structure of most organizations, that activities be organized. In a sense, what is involved is the organization of cooperation. A given supervisory style may be conditioned by a number of diverse factors, but it may also be a response dictated by the need for cooperation. In essence, all of the contextual factors constitute, in some manner, "highly organized cooperative efforts". It is not surprising, therefore, that contextual factors become more important in a high danger situation. This is particularly evident in the case of autonomy and structure-initiating supervision. In a high danger situation, autonomy explains 2.92% of the variance in job satisfaction, but none of the variance in a low danger situation. Structure-initiating supervision explains 6.48% of the variance in job satisfaction in a high danger situation, but only

4.87% of the variance in a low danger situation.

Interesting results occur when personal factors are examined. In a high danger situation, years-on-the-job explains 2.38% of the variance in job satisfaction, but only .35% of the variance in a low danger situation. Age explains none of the variance in job satisfaction in a high danger situation, but 2.37% of the variance in a low danger situation. Results of this nature suggest the possible importance of work related experience for coping with danger, although the negative correlations evidenced in Table 6-4 suggest an inverse relationship, such that, the greater the number of years-on-the-job, the lower the job satisfaction.

Job satisfaction is only part of coping with danger. Earlier, it was mentioned that high levels of job satisfaction in the face of low levels of effectiveness may result in the loss of a job. Accordingly, attention is now directed toward stepwise regressions performed on effectiveness controlling for danger. Table 6-9 represents the results of a stepwise regression performed on effectiveness in a high danger situation and Table 6-10 represents the same regression in a low danger situation.

A comparison of Table 6-9 and Table 6-10 reveals that 31.24% of the variance in effectiveness is explained in a high danger situation and 38.26% of the variance is explained in a low danger situation. These contextual

Table 6-9

Stepwise Regression on Effectiveness

(High Danger)

$r^2 = 31.24\%$ $p = .0473$ $n = 48$

Variables in Regression Equation	Variance Explained By Each Variable		Percentage of Total Explained Variance
1. Group Cohesiveness	15.02%	contextual	89.4%
2. Total Autonomy*	7.46%		
3. Structure-Initiating Supervision	.76%		
4. Supportive Supervision	4.71%		
5. Status	2.95%	personal	11.6%
6. Years-on-the-Job	.07%		
7. Age	-----		
8. Education	.28%		

* Non-work-task and work-task autonomy were substituted for Total Autonomy in the same equation with non-work-task autonomy explaining 2.28% and work-task autonomy explaining 6.48% of the variance in Effectiveness.

Table 6-10

Stepwise Regression on Effectiveness

(Low Danger)

$r^2 = 38.26\%$ $p = .0164$ $n = 45$

Variables in Regression Equation	Variance Explained By Each Variable		Percentage of Total Explained Variance
1. Group Cohesiveness	20.17%	contextual	63.5%
2. Total Autonomy*	3.36%		
3. Structure-Initiating Supervision	.67%		
4. Supportive Supervision	.12%		
5. Status	1.67%	personal	36.5%
6. Years-on-the-Job	.51%		
7. Age	11.07%		
8. Education	.69%		

* Non-work-task and Work-task Autonomy were substituted for Total Autonomy in the same equation with non-work-task autonomy explaining 3.53% and work-task autonomy explaining .19% of the variance in Effectiveness.

and personal factors are more important predictors of changes in effectiveness in a low, rather than high danger situation. In a high danger situation, contextual factors account for 89.4% of the explained variance in effectiveness, but only 63.5% of the explained variance in a situation of low danger. This suggests, of course, that although contextual factors are once again more important generally, they are most important in a high danger situation.

Comparing the effect of contextual factors in situations of high and low danger, it can be seen that group cohesiveness explains more of the variance in effectiveness in a low, rather than high danger situation. Although 15.02% of the variance is explained in a high danger situation, 20.17% is explained in a low danger situation. This, of course, does not mean that group cohesiveness is an unimportant variable in a situation of high danger, but only that it is more important in a low danger situation. These results serve as a reminder that effectiveness is not the same as job satisfaction.

What is particularly noteworthy in this comparison of control conditions is the increased importance of total autonomy and supportive supervision in a high danger situation. Total autonomy explains 7.46% of the variance in effectiveness in a high danger situation, but only 3.36% of the variance in a low danger situation.

Supportive supervision explains 4.71% of the variance in effectiveness in a high danger situation, but only .12% of the variance in a situation of low danger. What is also worthy of mention, is the fact that when non-work-task and work-task autonomy are substituted for total autonomy, together they explain 8.76% of the variance in effectiveness in comparison to the 7.46% explained by total autonomy in a high danger situation. Work-task autonomy accounts for 6.48%, and non-work-task autonomy accounts for 2.28%, of the variance in effectiveness. The greater importance of work-task autonomy serves to emphasize, as was pointed out in Chapter 4, the necessity of uninterrupted work for high levels of effectiveness - especially amongst miners in a high danger situation.

These results with autonomy and effectiveness are in marked contrast to the situation when job satisfaction is the dependent variable and, together, both work-task and non-work-task autonomy only explain 2.96% of the variance in a high danger situation. Of course, these differences should come as no surprise for, in Chapter 5, no support existed for the hypothesized relationship between autonomy and job satisfaction, but considerable support existed for the relationship between autonomy and effectiveness.

Just as differences in the importance of autonomy are observed when the dependent variable is job satisfaction or effectiveness, differences are also observed in the importance of supervisory styles when the dependent variable changes. Of course, the importance of independent variables is also affected by different conditions of danger. This is most striking when the importance of supervisory styles on effectiveness is considered. Here, in a high danger situation, supervisory styles account for 5.47% of the variance in effectiveness, but only .79% of the variance in a low danger situation. In that high danger situation, supportive supervision accounts for 4.71% of the variance and structure-initiating supervision accounts for only .76% of the variance. It appears, given the marginal impact of supervisory styles upon effectiveness in other control conditions, that only supportive supervision is an important influence on effectiveness and this influence is confined to situations of high danger.

Such is not the case when job satisfaction is the dependent variable (see Table 6-7 and Table 6-8). In a high danger situation, supervisory styles account for 11.73% of the variance in job satisfaction and, in a low danger situation, supervisory styles account for 15.63% of the variance. In that high danger situation, structure-initiating supervision accounts for 6.48% of the variance in job satisfaction and supportive supervision accounts for 5.25% of the variance. In a low danger situation, however, structure-initiating supervision accounts for only 4.87% of the variance in job satisfaction whereas supportive supervision accounts for 10.76% of the variance. These results reaffirm, as was noted in the discussion of Table 6-3, that supervisory styles are more important for job satisfaction than for effectiveness. If it is considered that supportive supervision explains 19.86% of the variance in job satisfaction in Table 6-3 under conditions of high danger, but only 5.25% of the variance in Table 6-7 under equivalent conditions, then it appears, given the increased importance of group cohesiveness and structure-initiating supervision in Table 6-7, that a complex dynamic involving supervisory styles and group cohesiveness is at work when job satisfaction is considered. Although an investigation of this dynamic is beyond the scope of this study, any future work in the area might do well to consider the distinct possibility of varying interaction effects between supervisory styles and group cohesiveness under different conditions of danger.

When the impact of personal variables on effectiveness is considered, it is evident that personal factors are more important in a low, rather than high danger situation. In a high danger situation, personal variables account for only 11.6% of the explained variance in effectiveness, but in a low danger situation they account for 36.5% of the explained variance.

Only status, by explaining 2.95% of the variance in effectiveness, has an appreciable impact in a high danger situation. However, in a low danger situation, age explains 11.07% of the variance in effectiveness. This impact is exceeded only by the impact of group cohesiveness. It appears that the older worker is a more effective worker in a low danger situation, but age, of and by itself, does not appear to aid in coping with danger. When it is considered that status is accorded to a miner partially as a result of his competence in doing his job and, in order to do his job, he must successfully cope with danger; it should come as no surprise that status is important in coping with danger.

Throughout this thesis, mention has been made of the potential importance of experience for coping with danger. Unfortunately, given the predominance of negative correlations between personal variables and job satisfaction in a high danger situation, it is only in the case of effectiveness that some evidence to support this view is mustered. Status may, given the preceding explanation, be a virtual reward for coping with danger, but it is also primarily gained through job experience. Intuitively, it appears that experience is important in coping with danger, but exactly what is entailed in the notion of experience has not been elaborated. Analytical and conceptual clarity in the concept of experience might well serve future research concerned with coping with danger.

Summary

In this chapter, emphasis was placed on determining the importance of certain selected independent variables as predictors of changes in the major dependent variables with, and without, controlling for danger. Two forms of regression analysis were undertaken. These were: (1) Multiple Regression (2) Stepwise Regression. Discussion centered on the merits of each approach as well as the assorted methodological difficulties with the approaches.

The results of multiple regression analysis revealed, once again, the overall importance of group cohesiveness as not only a predictor of changes in the dependent variables, but as a means of coping with danger. Although autonomy generally appeared to exert little influence on job satisfaction, both non-work-task and total autonomy became of some importance as predictors in a high danger situation, but their impact must still be regarded as marginal. In the case of effectiveness, however, substantial amounts of variance were explained by the action of autonomy. Both work-task and total autonomy had influence in a high danger situation, while non-work-task autonomy appeared to be important in a low danger situation.

In an investigation of the importance of structure-initiating supervision and supportive supervision, it was determined that these supervisory styles had greater impact on job satisfaction than on effectiveness. However, when these variables were entered into multiple regression equations in different sequences, the existence of interaction effects amongst the predictor variables was revealed. These interaction effects made a definitive statement, about the greater importance of either supportive supervision or structure-initiating supervision, problematic. Despite the problematic nature of the importance of individual variables, supervisory styles did appear to be important factors in any discussion of coping with danger.

Multiple regression analysis was also undertaken with four additional independent variables. These variables were status, years-on-the-job, age, and education. Given the preponderance of negative correlations between these predictors, only status, in its positive relationship with effectiveness, could be said to be important in coping with danger. Of noteworthy importance was the positive influence age had on both job satisfaction and effectiveness in a low danger situation.

Multiple regression analysis was undertaken to evaluate the importance of individual variables as not only predictors of changes in the dependent variables, but as a necessary prelude to the development of two variable clusters to be used in stepwise regression analysis. These two clusters of variables were termed: (1) Contextual (2) Personal. Contextual variables included autonomy, group cohesiveness, structure-initiating supervision, and supportive supervision. Personal variables included status, years-on-the-job, age, and education. These clusters were created and used in stepwise regression analysis in order to discover whether aspects of the work and organizational environment, or personal attributes, were more important in coping with danger. The results of stepwise regression analysis confirmed the importance of contextual variables in situations of high danger and the increased importance of personal factors in situations of low danger.

In the concluding chapter, emphasis will be placed on evaluating what has, and has not, been accomplished in this study. The possible implications of some of the important findings, as well as recommendations for future research will be dealt with.

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Chapter 7

Summaries and Conclusions

Introduction

In this study, an attempt was made to understand how underground miners coped with the fact that they worked in a dangerous environment. Obviously, in a study of coping with danger, it becomes important to understand the aspects involved in a conceptualization of danger. Considerable attention was devoted to the task of demonstrating that miners faced not only the possibility of accidents (Type I Danger), but the possibility of contracting occupational diseases such as lung cancer and silicosis (Type II Danger). In addition to the distinction between types of danger, another important aspect of the concept appeared to be the objective and subjective facets. Did the respondents' perceptions of danger correspond to how dangerous conditions actually were? Could an inaccurate perception of danger be an aid in coping with danger? Throughout this study attempts were made to answer the preceding questions and gain some idea of the importance of perception in coping with danger.

Although perception was a factor worthy of consideration in coping with danger, it was not the only factor. A review of the literature revealed that autonomy, group cohesiveness, and the occupational community were potentially important factors for increasing job satisfaction and effectiveness - even in the face of danger. Operating on the assumption that high job satisfaction and effectiveness levels, in the face of danger, were indicative of success in coping with danger, a research model was devised. This model employed autonomy, group cohesiveness, and off-the-job contact (the operationalization of the concept of occupational community) as independent variables and job satisfaction and effectiveness as dependent variables. Relationships between these variables were postulated and examined with, and without, controlling for different conditions and types of danger.

Although the main thrust of analysis in this study revolved around the research model, an attempt was made in Chapter 6, through regression analysis, to consider the importance of certain other factors. Among these factors were supervisory styles, status, years-on-the-job, age and education. In a somewhat more complicated analysis involving stepwise regression, an attempt was made to discover if aspects of the working environment (contextual variables) or personal attributes of individuals (personal variables) were more important for coping with danger.

In the next section, some theoretical and practical implications of the research findings will be considered.

Theoretical and Practical Implications

In this study, several factors emerged as potentially important considerations in coping with danger. These factors included perception, autonomy, group cohesiveness, off-the-job contact, supervisory styles and experience.

In this section, the implications of findings associated with these factors will be explored. First on the list of factors worthy of consideration is perception.

Perception

The overall general conclusion that emerges in this study with regard to perception concerns the apparent comparability of the objective and subjective facets of danger. If a man is working in a dangerous situation, he is likely to perceive that situation as dangerous.

Two interesting results are, however, worthy of consideration. The first concerns the discrepancy between mill operators and their supervisors with regard to how danger is perceived and the second involves a tendency for those facing the greatest possibility of contracting occupational diseases to reduce the uncertainty of their position with regard to the issue of occupational diseases.

The fact that mill operators and their supervisors do not share a common perception of danger, may be accounted for by the fact that the danger they face is not of sufficient severity for a consensus about its existence to develop. When it is considered that only 38% of the mill operators and 60% of their supervisors regard working conditions as dangerous, it may be assumed that an inaccurate perception of danger may be important in coping with that danger. What may be crucial, however, for inaccurate perceptions to develop is the existence of some ambiguity about the stimulus.

When it is considered that the contraction of occupational diseases involves a long period of exposure, it may be concluded that some ambiguity surrounds the stimulus. The reduction of uncertainty does not preclude the possibility of inaccurate perceptions. In fact, a polarization of responses about the accuracy of reports about lung cancer and silicosis, would suggest that at least one group of responses is inaccurate. Given the extremely volatile nature of the subject matter, responses could be characterized as exhibiting either a denial, or an almost fatalistic acceptance of the hazard.

The fundamental difference between this example and the example dealing with mill operators and their supervisors concerns the type of danger and the amount of control subjects are capable of exercising over their fate. The example dealing with mill operators and their supervisors involved the possibility of having an accident and, in such instances, an individual's behavior may be a major factor in whether an accident occurs or not. In the example dealing with those with a high probability of contracting occupational diseases, an individual's behavior may be of little consequence.

Although the results concerning perception are by no means conclusive, several factors worthy of theoretical and empirical investigation have been discussed. First, inaccurate perceptions may develop in situations where ambiguity surrounds the stimulus. Second, if a situation is threatening, ambiguous, and one in which subjects have little control, these subjects may strive to reduce the uncertainty of their position. Third, the reduction of uncertainty may involve either a denial, or an almost fatalistic acceptance of the hazard.

If perception is a process that aids in coping with danger, it appears that the factors and their relationships noted above, may be important aspects of that process. If further theoretical and empirical work justifies, or clarifies, the importance of these factors in the perceptual process, we may then possess a more adequate understanding of how the perceptual process aids in coping with danger. This understanding may then facilitate certain practical solutions to the problem of maintaining psychological comfort in the face of danger.

Although some implications can be drawn from the work done with perception, implications can also be drawn from the work done with autonomy.

Autonomy

The lack of significant relationships between autonomy and job satisfaction would suggest, as has been done before (cf., Turner and Lawrence,1965 and White,1972), that some theoretical caution be voiced before proclaiming the importance of autonomy for increased job satisfaction. In this study, it was suggested that freedom from others while not performing tasks required by the job (non-work-task autonomy), may be akin to social isolation. This social isolation may prevent the individual from drawing upon the social supports in the environment to aid in coping with danger and, thereby, have negative consequences for job satisfaction. In essence, these results suggest that a clearer theoretical understanding of autonomy might involve consideration of its possible negative, as well as positive, consequences for job satisfaction. Autonomy may, in certain instances, not aid in coping with danger.

Although no significant relationships were found between autonomy and job satisfaction, such was not the case when the relationships between autonomy and effectiveness were considered. Of specific importance for coping with danger was the finding that work-task and total autonomy had a positive impact on effectiveness in a high danger situation. It appears that a combination of non-work-task and work-task autonomy, expressed in total autonomy, may be most important for increased effectiveness. What is striking, however, is the lack of a significant relationship between non-work-task autonomy and effectiveness in a high danger situation. These results suggest once again the possible negative aspect of autonomy, as well as pointing out that freedom from others while performing work tasks may increase effectiveness. In order to be effective, it may indeed be important that workers are allowed to maintain concentration and continuity in the face of danger.

Although greater empirical clarification involving consideration of other control conditions (eg. a need for autonomy) is necessary, some tentative implications have emerged from this study. First, the assumption that autonomy will always have positive consequences should be reconsidered. Autonomy may have negative, as well as positive, consequences and any theoretical conceptualization of autonomy might gain by consideration of different situations (eg. high danger) that might produce negative consequences. Second, it appears that the distinction between freedom while performing tasks on the job (work-task autonomy) and freedom while not performing these tasks on the job (non-work-task autonomy) is a useful distinction. Tentatively, it does appear that maximum coping benefit is maintained if individuals are allowed freedom while performing task requirements, but receive some intervention when not performing task requirements. From a practical standpoint, those seeking to implement changes in organizational design, or humanize the workplace, might do well to consider the effects of different types of autonomy in threatening or hazardous situations.

Next, some implications of the results found with group cohesiveness will be discussed.

Group Cohesiveness

The most consistent finding in this study concerns the significant positive impact group cohesiveness has had on both job satisfaction and effectiveness in situations of high danger. This finding demonstrates the importance of group cohesiveness as a means of coping with danger and confirms the theoretical position advanced by Mechanic (1974) about the importance of social supports in the coping process.

Although some evidence (cf.,Seashore,1954) exists to suggest that group cohesiveness will have positive impact on job satisfaction and effectiveness only if certain other factors (eg. confidence in management) are present, it would appear that one of the most practical means of dealing with dangerous or threatening situations involves the development and perpetuation of group cohesiveness.

Another factor worthy of consideration is off-the-job contact and attention is now directed to an examination of some potential implications that can be drawn from the results dealing with it.

Off-The-Job Contact

The concept of off-the-job contact involves a series of interactions comprising participation in activities, talking about the job, and helping behavior. These interactions, when considered singularly or in combination, did not directly affect job satisfaction or effectiveness. Talking about the job did, however, have some impact on group cohesiveness in a high danger situation and, by so doing, could be considered to indirectly aid in coping with danger. The theoretical assumption adopted from Seashore (1954) that heightened interaction would result in high levels of group cohesiveness was not totally substantiated. The relationship appeared to be dependent on the occupational group and the kinds of interactions involved. It would appear that greater theoretical specification into how group cohesiveness could be fostered and perpetuated in the face of danger is called for. In a theoretical specification, consideration of the kinds of interaction as well as occupational groupings might be of benefit.

The impact of supervisory styles was first investigated in Chapter 6. The implications of the results dealing with supervisory styles will now be discussed.

Supervisory Styles

The impact of two supervisory styles was investigated. These supervisory styles were: (1) Structure-Initiating Supervision (2) Supportive Supervision. Both structure-initiating and supportive supervision had a significant positive impact on job satisfaction in a high danger situation. Supportive supervision, however, was the only variable of the two, that had a significant positive impact on effectiveness in a high danger situation. These results do suggest that supervisory styles are of importance in coping with danger. If higher job satisfaction levels are desired, a combination of supervisory styles appears called for. If higher effectiveness levels are desired, supportive supervision appears called for. The theoretical and empirical problem that emerges concerns what the proper combination of supervisory styles for increasing job satisfaction in the face of danger should be.

This situation becomes somewhat more complex when it is revealed that during the course of analysis in this study, numerous interaction effects were observed between the independent variables, so that it appeared that a complex dynamic involving supervisory styles, autonomy, and group cohesiveness was at work. The major theoretical implication that emerges from these findings is that coping with danger may be a complex process and that the challenge becomes one of theoretically understanding the dynamic.

To date, the implications of the findings associated with all the various factors, except experience, have been discussed. Attention will not be focussed on the implications of the findings associated with experience.

Experience

In this study, four indicators of experience (also called personal variables) were employed. These indicators were status, years-on-the-job, age, and education. Of these indicators, only status consistently appeared to have a positive impact on the dependent variables in a high danger situation. The explanation proposed at that time suggested that status was accorded to individuals partially as a result of their success in coping with danger. From a theoretical vantage point, it might even be suggested that individuals with high status have a vested interest in coping with danger. To some extent, experience may be a factor in coping with danger if the rewards for successful coping outweigh the costs.

This linkage with experience may have theoretical implications, but what also appears to be of theoretical importance is the clarification of the concept. Exactly what is meant by, or entailed in, the concept of experience is, as yet, unclear.

To date, some theoretical and practical implications of the research findings have been explored. In the next section, emphasis will be placed on discussing the directions that future research in this area might take in light of the findings and lessons learned in this study.

Directions For Future Research

In any consideration of future research possibilities, it would seem apparent that research can proceed on either a theoretical or an empirical plane. Ideally, each form of research should complement the other. In the preceding discussion, numerous theoretical implications were drawn from the research findings. These implications, if followed, could have a bearing on the conceptualization of not only some of the factors involved in coping, but the process as well. This would, no doubt, shape the direction of future research.

In this section, the major emphasis will be placed on concerns of a more methodological nature. Topics include scope, units of analysis, and measurement of concepts. Attention is now directed to an examination of how the scope of future research might be improved.

Scope

Although, scope often refers to how a particular study focuses on a subject, certain other factors are of related concern. These factors involve questions about the generalizability of findings and the subject matter considered.

Of particular concern in this study, is the question of the generalizability of the research findings. The miners and mill operators in this study worked in the uranium mines of Northern Ontario and lived in a fairly isolated community. Would research findings gleaned from this study be applicable to those working in coal, iron, copper, nickel, gold, silver, and other mines? Given the fact that our subjects were involved in mining, would these research findings pertain to those working in other hazardous environments as well? Obviously, given the wide range of literature reviewed, a case could be made that argued in favour of the generalizability of these findings, but a certain doubt would, nonetheless, persist. It would appear that future research might well profit by broadening the scope of study to include not only different mining environments, but other hazardous working environments as well.

Although contextual factors were deemed to be more important than personal factors for coping with danger, the question of whether those working in dangerous environments are able to cope as a result of factors in the environment, or as a result of certain personality characteristics (eg. high risk taking propensity), remains unanswered. Future research might do well to consider the possible effects of psychological predispositions as a means of coping with danger.

Closely allied with the preceding point, and of relevant concern in a discussion of the focus of a study, is the manner in which the research project is conceptualized and undertaken. In this study, data was gathered from respondents at one point in time. By randomly selecting these respondents, it was assumed that individuals in various stages of their work careers would be proportionately represented. The major difficulty with such an approach may involve the possibility that a majority of these respondents have coped with danger. If coping is a process, and psychological predispositions are important considerations, it appears that those who do not cope, as well as those who do cope, should be considered. One means of achieving this end, would call for a research design involving a longitudinal, rather than a cross sectional, study.

Subjects entering a dangerous work situation for the first time could be asked a series of questions designed to provide information on psychological profiles, demographic characteristics, and job expectations. If their cooperation were available, subjects who remained working in the dangerous environment as well as those who did not, could be asked the same series of questions (excluding most demographic material) at later points in time. If additional information on aspects of the working environment and reasons for attrition were obtained from the relevant subsamples, it would then be possible to determine not only the relative importance of psychological and contextual factors, but to emphasize the process of coping with danger.

Although the scope of a study is of considerable import, the unit of analysis adopted may have consequences as well. In the next segment, discussion will center on concerns related to the units of analysis employed.

Units of Analysis

The original intention in this study, adopted from concerns voiced by Mechanic (1974), was to use the group as the basic unit of analysis. Unfortunately, difficulties with the sampling frame made this strategy impossible.

On the preceding discussion, it was pointed out that an examination of the importance of psychological factors in the coping process was not undertaken in this study. Likewise, by adopting the individual as the basic unit of analysis, a complete examination of the importance of the group as a means of coping with danger remains unexplored, for certain questions are unanswered. Do members of the same cohesive group share a common perception of danger? To what extent is the group responsible for shaping individual perceptions? What exactly constitutes the kind of social support a group may provide in the face of danger? What member characteristics, if any, facilitate the development of group cohesiveness? What other factors (eg. supervisory styles), in addition to, or coincident with, group cohesiveness might aid in coping with danger? By adopting the group as the basic unit of analysis in future research, some answers to the preceding questions may be provided. Of course, nothing would suggest that only one unit of analysis must be employed in a study. By having sufficient information, it might be possible to adopt both the individual and the group as units of analysis. This might provide potentially important information on linkages between units of analysis.

The final consideration in this discussion of future research directions involves the measures employed.

Measurement of Concepts

Earlier, in a discussion of theoretical and practical implications it was pointed out that several of the concepts in this study were in need of greater theoretical and conceptual clarity. There is no need to reiterate that discussion, but of particular concern in this study is the concept of danger. An attempt has been made to provide not only objective and subjective indicators, but to consider types of danger as well. Although all possibilities in the mining environment have been considered, a certain weakness can be found in the fact that a supervisor's assessment of danger is considered to be an objective measure. This is still a perception and may, as appeared to be the case with mill supervisors, be subject to other influences. The question also remains as to whether asking about physical conditions is tapping the danger element in the mill?

Another weakness reveals itself in that only one question was asked about the possibility of contracting occupational diseases and that question was an indirect one. Of course, given the sensitive nature of the subject, few alternatives were presented.

Greater effort working with the measurement of danger appears called for. What also appears to be called for is the development of measures of danger that are applicable in all hazardous working environments and yet capable of distinguishing those working in one environment from those in another environment. Future research might profitably be oriented to these ends.

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Appendix 1

Questionnaire and Supervisor's Rating Scale

Department of Sociology
The University of Alberta

Questionnaire

"Satisfactions in Work"

This questionnaire is being used to gather information on two types of working environments - the mine and the mill. It is our hope that by so doing we may better understand those factors contributing to people's satisfactions in their work.

Your answers to these questions will be treated as strictly confidential and no one outside the University of Alberta research group will see these questionnaire sheets. Your answers will be combined with the answers of everyone else taking this questionnaire, and only the overall statistical results will be used.

Your cooperation in this research is greatly appreciated and we extend our thanks.

Instructions

Most of the questions asked provide you with a variety of answers. There are no right or wrong answers; we are interested in your opinion. Please answer each question in the way that makes sense to you. For example:

"How do you come to work each day?"

____By bus
____By car
____By camel
____By bicycle

If you normally come to work on your wife's camel, then you would put an X beside that answer as in the example above.

CONFIDENTIAL

The replies you supply are considered to be strictly confidential, and no one outside the University of Alberta research group will see these response sheets.

1. Please print your name____________________________
2. Regular job classification_________________________
3. Years on present job_________
4. Years with company__________
5. Age__________
6. On your job, do you? (Please place an X in the appropriate blank)

____Work on your own
____Member of a work team

7. Schooling?

____Some public school
____Graduated public school
____Some high school
____Graduated high school
____Some university
____University graduate

8. Marital status?

____Single
____Married
____Separated
____Widowed
____Divorced

9. Other than Canadian, to what ethnic or cultural group do you consider yourself to belong? (Please print your answer) ______________________________

____

10. How many separate employers have you had in the past year?

____none
____1
____2-3
____4-5
____6-7
____8 or more

11. In the last month, how many days have you been late?

____none
____1
____2-3
____4-5
____6-7
____8 or more

12. In the past month, how many days have you missed because you did not feel like going to work?

____none
____1
____2-3
____4-5
____6-7
____8 or more

13. On a job, how much responsibility do you normally like to have?

____A great deal
____Quite a bit
____Some
____A little
____None

14. Think of your present work. What is it like most of the time? In the blank beside each work or phrase below, write

y for "Yes" if it describes your work
n for "No" if it does not describe it
? if you cannot decide

WORK ON PRESENT JOB

____Fascinating
____Routine
____Satisfying
____Boring
____Good
____Creative
____Respected
____Hot
____Pleasant
____Useful
____Tiresome
____Challenging
____On your feet
____Frustrating
____Simple
____Endless
____Gives sense of accomplishment
____Healthful

15. On some jobs, the speed at which the work is done is largely determined by the routines of the machines used on the job. On your job, how much control do you normally have over the speed with which you do your work?

____None
____A little
____Some
____Quite a bit
____A great deal

16. How important is it to you that you have control over the way that you do your work and the speed at which you do your work?

____Very important
____Important
____Doesn't matter
____Unimportant

17. Do you think that workers should participate more in decisions affecting their own work?

____Strongly disagree
____Disagree
____Uncertain
____Agree
____Strongly agree

18. Would you personally like to participate in decisions affecting your own work?

____Very much interested
____Somewhat interested
____Neither interested nor disinterested
____Not interested

19. Do you think that workers should participate more in decisions affecting the company as a whole?

____Strongly disagree
____Disagree
____Uncertain
____Agree
____Strongly agree

20. Would you personally like to participate in decisions affecting the company as a whole?

____Very much interested
____Somewhat interested
____Neither interested nor disinterested
____Not interested

21. How often do you consider your job to be dangerous?

____A great deal
____Quite a bit
____Some
____A little
____None

22. On the whole, how satisfied are you with your present work?

____Very dissatisfied
____Dissatisfied
____Somewhat dissatisfied
____Uncertain
____Somewhat satisfied
____Satisfied
____Very satisfied

23. Think of the pay you get now. How well does each of the following words or phrases describe your present pay? In the blank beside each word put

y if it describes your pay
n if it does not describe it
? if you cannot decide

PRESENT PAY

____Income adequate for normal expenses
____Satisfactory profit sharing
____Barely live on income
____Bad
____Income provides luxuries
____Insecure
____Less than I deserve
____Highly paid
____Underpaid

24. Think of the majority of the people that you work with now or the people you meet in connection with your work. How well does each of the following words or phrases describe these people? In the blank beside each work below, put

y if it describes the people you work with
n if it does not describe them
? if you cannot decide

PEOPLE ON YOUR PRESENT JOB

____Stimulating

____Boring

____Slow

____Ambitious

____Stupid

____Responsible

____Fast

____Intelligent

____Easy to make enemies

____Talk too much

____Smart

____Lazy

____Unpleasant

____No privacy

____Active

____Narrow interests

____Loyal

____Hard to meet

25. If you had the chance to do the same kind of work, with the same pay, in another work group, how would you feel about changing?

____Very glad to move
____Glad to move
____Indifferent
____Unwilling to move
____Very unwilling to move

26. If you were to think of other work groups you have seen, how does your work group compare with those in terms of how close and tightly knit it is, and how the members help each other out?

____Very poor
____Poor
____About average
____Good
____Very good

27. In those moments when there is a lull in the work, how much freedom do you have from the group you work with in deciding how you use that free time?

____A great deal
____Quite a bit
____Some
____A little
____None

28. Once you have been assigned your work, how often does the group you work with leave you alone to complete the work by yourself and in your own way?

____Never
____Seldom
____Occasionally
____Often
____Always

29. On the whole, how satisfied are you with your present pay?

____Very satisfied
____Satisfied
____Somewhat satisfied
____Uncertain
____Somewhat dissatisfied
____Dissatisfied
____Very dissatisfied

30. On the whole, how satisfied are you with the people on your present job?

____Very dissatisfied
____Dissatisfied
____Somewhat dissatisfied
____Uncertain
____Somewhat satisfied
____Satisfied
____Very satisfied

31. Thinking about your own job and the people you have known, how do you feel about the following satement? "Reports about the possibilities of getting silicosis and lung cancer are greatly exaggerated."

____Strongly agree
____Agree
____Uncertain
____Disagree
____Strongly disagree

32. Off the job, when you meet someone from your shift, how often would you say you talked about the job?

____Never
____Very seldom
____Occasionally
____Fairly frequently
____Most of the time

33. Often, people who work together see each other off the job. Think of your coworkers. How often do you and some member or members of the group you work with, participate in the following activities? (Where many activities are listed under one heading, please consider all of them together, rather than separately, when making a reply)

1-Never; 2-Several times a year; 3-About once a month; 4-Several times a month; 5-Once a week; 6-More than once a week

PLEASE CHECK ONLY ONE NUMBER FOR EACH ACTIVITY...

	1	2	3	4	5	6
i) Having a drink at the local hotel	_	_	_	_	_	_
ii) Outdoor recreation such as fishing, hunting, camping, swimming, skiing, etc.	_	_	_	_	_	_
iii) Home recreation such as picnics, card playing, gardening, home repair, etc.	_	_	_	_	_	_
iv) Community activities such as dances, fund raising, banquets, walkathons	_	_	_	_	_	_
v) Brief drop in visits for conversation	_	_	_	_	_	_
vi) Watching or playing in commercial recreation activities such as basketball, baseball, football, soccer, hockey, volleyball, bowling, pool, billiards, curling, etc.	_	_	_	_	_	_
vii) Union meetings or activities	_	_	_	_	_	_

34. Sometimes, things can go wrong and a fellow doesn't know where to turn to, or maybe it's just a matter of a couple of dollars until payday or checking out what you already know with someone else. Think of your co-workers. How often, in the following circumstances, have you given or received help from them?

1-Never; 2-Several times a year; 3-About once a month; 4-Several times a month; 5-Once a week; 6-More than once a week

PLEASE CHECK ONLY ONE NUMBER FOR EACH ACTIVITY...

	1	2	3	4	5	6
i) Giving or receiving advice on a non-work related matter. (eg. buying or selling a house or car, marital, children, etc.	_	_	_	_	_	_
ii) Giving or receiving financial aid in a time of need	_	_	_	_	_	_
iii) Giving or receiving aid that is not directly financial such as babysitting, home repair or improvement, clothing, food, etc.	_	_	_	_	_	_

35. Think of the opportunities for promotion that you have now. How well does each of the following words or phrases describe them? In the blank beside each word, put

y for "Yes" if it describes your opportunities for promotion
n for "No" if it does not describe them
? if you cannot decide

OPPORTUNITIES FOR PROMOTION

____Good opportunity for advancement

____Opportunity somewhat limited

____Promotion on ability

____Dead-end job

____Good chance for promotion

____Unfair promotion policy

____Infrequent promotions

____Regular promotions

____Fairly good chance for promotion

36. What do you think your chances are for getting a better job or promotion within this company?

____Excellent
____Very good
____Good
____Average
____Fair
____Poor
____Inadequate

37. What do you think the average worker's chances are for a promotion or better job with this company?

____Inadequate
____Poor
____Fair
____Average
____Good
____Very good
____Excellent

38. In those moments when there is a lull in the work, how much freedom do you have from the individuals (excluding your supervisor) you work with in deciding how you use this free time?

____A great deal
____Quite a bit
____Some
____A little
____None

39. How much chance does your job give you to do the things you are best at?

____No chance
____Very little chance
____Some chance
____A fairly good chance
____A good chance

40. Compared to other jobs outside the mine, what do you consider your chances are of having an accident?

____A good chance
____A fairly good chance
____Some chance
____Very little chance
____No chance

41. On the whole, how satisfied are you with your opportunities for promotion?

____Very dissatisfied
____Dissatisfied
____Somewhat dissatisfied
____Uncertain
____Somewhat satisfied
____Satisfied
____Very satisfied

42. Think of the kind of supervision you get on your job. How well does each of the following words or phrases describe this supervision? In the blank beside each word below, put

y for "Yes" if it describes the kind of supervision you get on your job
n for "No" if it does not describe it
? if you cannot decide

SUPERVISION ON PRESENT JOB

____Asks my advice
____Hard to please
____Impolite
____Praises good work
____Tactful
____Influential
____Up-to-date
____Doesn't supervise enough
____Quick tempered
____Tells me where I stand
____Annoying
____Stubborn
____Knows job well
____Bad
____Intelligent
____Leaves me on my own
____Lazy
____Around when needed

43. How good a description of your supervisor is the following statement? "He asks group members to follow standard rules and regulations, lets workers know what is expected of them, makes his attitudes clear, and describes what shall be done."

____Very good
____Good
____Fairly good
____Poor
____Very poor

44. How good a description of your supervisor is the following statement? "He is friendly, approachable, listens to suggestions made by the group, and generally looks out for the welfare of all workers he supervises."

____Very poor
____Poor
____Fairly good
____Good
____Very good

45. Do you think that your supervisor recognizes and gives you credit for your good work performances and efforts?

____Never
____Seldom
____Occasionally
____Often
____Always

46. In doing your job, if there are several ways to complete the work, how much say do you have as to which one you actually use?

____A great deal
____Quite a bit
____Some
____A little
____None

47. In those moments when there is a lull in the work, how much freedom do you normally have from your supervisor in deciding how you use this free time?

____None
____A little
____Some
____Quite a bit
____A great deal

48. Once you have been assigned your work, how often does your supervisor leave you alone to complete it by yourself?

____Always
____Often
____Occasionally
____Seldom
____Never

49. Do any individuals that you work with (not including your supervisor) try to influence the way in which you do your job or the rate at which you do your work?

____Never
____Seldom
____Occasionally
____Often
____Always

50. On the whole, how satisfied are you with your present supervisor?

____Very satisfied
____Satisfied
____Somewhat satisfied
____Uncertain
____Somewhat dissatisfied
____Dissatisfied
____Very dissatisfied

51. Some things about a person's job are more important to them than others. From the list below, what features of a job do you consider to be most important? (Place a 1 beside the most important job feature for you; a 2 beside the second most important; and a 3 beside the third most important)

JOB FEATURES

____Good pay

____Good fringe benefits

____Job security

____Good opportunities for promotion

____Good supervisor

____Good co-workers

____Good opportunities to participate in decisions

____Good opportunities to exercise responsibility

____Safe working conditions

____Good opportunities to use my skills

____Others (Please specify)

____

____

Supervisor's Rating Scale

CONFIDENTIAL

The replies on this sheet are considered to be strictly confidential, and no one outside the University of Alberta research group will see these response sheets.

Worker's name________________________________

1. How would you rate the consistency of this worker in maintaining an acceptable level of quality in his output? (Please place an X in the appropriate blank)

____Highly unsatisfactory
____Quite unsatisfactory
____Average
____Quite satisfactory
____Highly satisfactory

2. How would you rate the quality of this worker's output?

____Highly satisfactory
____Quite satisfactory
____Average
____Quite unsatisfactory
____Highly unsatisfactory

3. How would you rate this worker's output?

____Highly unsatisfactory
____Quite unsatisfactory
____Average
____Quite satisfactory
____Highly satisfactory

4. How would you rate the consistency of this worker in maintaining an acceptable output level?

____Highly satisfactory
____Quite satisfactory
____Average
____Quite unsatisfactory
____Highly unsatisfactory

5. How would you rate this worker's absentee and lateness record?
____Highly unsatisfactory
____Quite unsatisfactory
____Average
____Quite satisfactory
____Highly satisfactory

6. Think of the other members of your shift. How does this man compare to them, in terms of the amount of responsibility he is given?
____Much more
____More
____About the same
____Less
____Much less

7. Considering where other members of your shift work, what are the physical conditions faced by this man in comparison?
____Much poorer
____Poorer
____About the same
____Better
____Much better

8. Consider this crew and the other shifts you have known and seen. How does his work group compare with those in terms of how close and tightly knit it is, and how the members help each other out?
____Very good
____Good
____About average
____Poor
____Very poor

Appendices 2 through 7

Work Characteristics of Miners and Mill Operators

APPENDIX 2

(Appendices 2 through 6 are adapted from Trist and Bamforth:1951)

General Classification	Sub Classification	Hours of Work	No. of men per shift	Methods of Payment
	Truck and scoop tram drivers (production workers)	2 shifts 7-3 day 7-3 night	2-4 per level up to 12	hourly wage plus bonus per ton if in excess of hourly wages for the month
	Rock Breaker Operators	2 shifts 7-3 day 7-3 night	1 per level 5 in all	hourly wage plus bonus per ton if in excess of hourly wages for the month
Servicemen	General Serviceman #1	works 1 shift 7-3 day	10+	hourly wage
	General Serviceman #2	works 2 shifts 7-3 day 7-3 night	1 per level + 2 pairs powder and supply	hourly wage

APPENDIX 2 (Continued)

Sub Classification	Group Organization	Tasks	Skills	Status
Truck and scoop tram drivers (production workers)	1 man per vehicle, but generally 2-4 work together	scoop tram gathers muck from drifts or mill holes, loads trucks or dumps muck into orepass, trucks dump muck into orepass	the ability to manoeuver cumbersome machinery in a quick and efficient manner	1
Rock Breaker Operators	1 per level integrated with regular shifts	break up the oversize ore unable to go through the grizzly	a rock breaker is a modified backhoe with a large steel bit and thus hand eye coordination is necessary	2/3/4
General Serviceman #1	interdependent pair or in group of 4-5	build bulk heads, repair backs, scale, bolt, cement construction	some mining and carpentry skills	2/3/4
General Serviceman #2	those on various levels integrated with regular shift others interdependent pairs	load and drive non production vehicles and personnel carriers	general labouring and driving skills	2/3/4

APPENDIX 3

General Classification	Sub Classification	Hours of Work	No. of men per shift	Methods of Payment
Servicemen	Tool Crib Attendants	2 shifts 7-3 day 7-3 night	1	hourly wage
	Leachers	2 shifts 7-3 day 7-3 night	2	hourly wage
	Beltmen	2 shifts 7-3 day 7-3 night	1 per level 5 in all	hourly wage
	Labourers	generally day unless attached to school stopes	8-10	hourly wage
	Transition "School Stope"	7-3 day 7-3 night	8-15	same

APPENDIX 3 (Continued)

Sub Classification	Group Organization	Tasks	Skills	Status
Tool Crib Attendants	———	make up bit racks, regulate and dispense materials	warehouse skills	5/6/7
Leachers	interdependent pair	movement of sprinklers in worked out stopes	general labouring driving skills	5/6/7
Beltmen	ties with each other via underground telephone	regulate feed on to conveyor belts, change chutes, scale and, if necessary blast	general labouring specific mining skills of scaling and blasting	5/6/7
Labourers	interdependent pairs or in larger groups of 4-5	shovelling, hauling cement, loading vehicles	general labouring skills	8
Transition "School Stope"	work as interdependent pair in the context of a larger peer group of 8-10	in the process of learning mining skills	washing, scaling, staging construction, blasting, bolting, drilling and mucking.	dependent on length of stay in school stope

APPENDIX 4

General Classification	Sub Classification	Hours of work	No. of men per shift	Method of Payment
Miner	1) Jumbo Driller	2 shifts 7-3 day 7-3 night	2 per drill 1 or more per level 10-16	hourly wage plus composite bonus per ton if in excess of month's wages
1,2 and 3 pairs may rotate on weekly or monthly basis	2) Hi Lo Operators (raise platform)	2 shifts 7-3 day 7-3 night	2 per platform, 1 or more per level 10-16	hourly wage plus composite bonus per ton/or per bolt if in excess of month's wages
1,2 and 3 may appear in as many as 3 locations per shift	3) Loaders "Cherry Picker"	2 shifts 7-3 day 7-3 night	2 per loader 1 or more per level 10-16	hourly wage plus composite bonus per ton if in excess of month's wages
1,2 and 3 make as much money as 4 (often more), do not work as strenuously, are older and have generally served time as 4's themselves, therefore their status is higher	4) Drift Miner "Pilot or Strike Heading	2 shifts 7-3 day 7-3 ni	2 per drift heading or pilot 1 or more per level 30-40	hourly wage plus bonus for bolts placed and tonnage removed if in excess of month's wages shared with cross shift

APPENDIX 4 (Continued)

Sub Classification	Group Organization	Tasks	Skills	Status
1) Jumbo Driller	interdependent pair integrated with regular shift on level +2 and 3	extend air and water lines, drill rounds judging rock and adjusting pattern for best possible break	some engineering, mining, plumbing and driving skills	1
2) Hi Lo Operators (raise platform)	interdependent pair integrated with regular shift on level +1 and 3	wash, scale and bolt in preparation for jumbo drill	speed and efficiency in the specific skills of washing, scaling and bolting plus driving skills	2/3
3) Loaders "Cherry Picker"	interdependent pair integrated with regular shift on level +1 and 2	load anex, set caps general preparation for blast	knowledge of explosives, how rock breaks driving skills	2/3
4) Drift Miner "Pilot or Strike Heading"	interdependent pair integrated with regular shift	build staging if necessary, wash, scale, bolt, muck, drill, blast and advance air and water lines	all of 1,2 and 3's skills excluding driving but adding carpentry skills	4

APPENDIX 5

General Classification	Sub Classification	Hours of Work	No. of men per shift	Method of Payment
	5) Longhole Drillers	2 shifts 7-3 day 7-3 night	2 per drill 8-15 throughout the mine per shift	hourly wage plus bonus for foot-advance if in excess of month's wages shared with cross shift
	6) Stope Miners	2 shifts 7-3 day 7-3 night	2 per stope 5-20 stopes per level 30-120 per shift	hourly wage plus bonus for bolts placed and tonnage removed if in excess of month's wages shared with cross shift
	7) Diamond Drillers	2 shifts 7-3 day 7-3 night	only 4-6 throughout the mine per shift	hourly wage plus bonus for length drilled if in excess of month's wages may or may not be shared with a cross shift

APPENDIX 5 (Continued)

Sub Classification	Group Organization	Tasks	Skills	Status
5) Longhole Drillers	interdependent pair isolated from regular level shift but integrated with one other pair	built staging, drill from 50 to 300 feet long in preparation for stope miners, blast 1 pair drills the other blasts blasters and drillers rotate on a weekly or monthly basis	some engineering, carpentry, driving and the specific mining skills of drilling and blasting	5/6
6) Stope Miners	interdependent pair integrated with regular shift on level	emphasis on washing, scaling, bolting and mucking may have to advance air and water lines, build staging, drill and blast	general mining skills and carpentry may develop some engineering and plumbing skills as well	5/6
7) Diamond Drillers	interdependent pair semi integrated with regular shift on level	set up diamond drill machine remove cores	general labouring and the specific skills associated with setting up and running a diamond drill	7

APPENDIX 6

General Classification	Sub Classification	Hours of Work	No. of men per shift	Methods of Payment
Mill Workers	A operator	3 shifts 8-4 day 4-12 aft 12-8 night	3-5	hourly wage (highest of all operators)
	B operator	3 shifts 8-4 day 4-12 aft 12-8 night	8-12	hourly wage (behind A operators)
	Labourer	may work 3 shifts in training, but generally only 1 8-4 day	8-10 day 2 on afternoon and night	hourly wage (behind A and B)

APPENDIX 6 (Continued)

Sub Classification	Group Organization	Tasks	Skills	Status
A operator	often works alone or interdependent pair	able to operate all areas in the mill often centered in IX	all milling skills including some knowledge of chemistry and metallurgy	1-3 (depending on work area, see Appendix 7)
B operator	interdependent pair	able to operate 1 or more areas	a B operator may possess partial or virtually complete milling skills, but unless he gains the specialized chemical and metallurgical skills, he will remain a B operator	4-6 (depending on work area, see Appendix 7)
Labourer	work in pairs or in groups of 5-6	load and unload supplies, hose, clean out tanks etc.	general labouring	7

APPENDIX 7

Specific milling skills are associated with various areas in uranium milling. There is considerable overlap in skill and task requirement among some areas, but the following specification yields some important differences.

Areas and operators	Skills
Crushing 2 operators one A and one B	operation of secondary crusher (jaw and cone crushers comprise the crushing operation) make sure vibrating bar grizzly does not drop excessive amounts of oversize, regulate feed, make sure conveyors are tracking properly and no extraneous materials enter the cone crusher
Grinding 2 often 3 If 3, one will be an A	operation of rod and pebble mills, maintain density in rod mill by regulating feed and water, check grind and make adjustments in water or feed to get desired grind/maintain density in pebble mill by regulating feed from rod mill and/or adding pebbles, check cyclones for oversize and density/take appropriate action eg. call shiftboss
"A" Area "Neutral Thickeners" 1 operator a B operator	regulation of feed into c area; sample densities are taken and pump feed adjusted accordingly
Areas B and C "Neutral Filtration and Leaching" 2 operators both B's one may be A if B has no experience	control panel operation (this panel locates areas of trouble in patchuka tanks and regulated neutral filters) change filter bags, regulate feed into filters through density checks and consultation with operator in A area, regulate flow of acid and steam into patchuka tanks/ general surveillance and partial maintenance.

APPENDIX 7 (continued)

Areas and operators	Skills
Areas E and D "Drum Filers and Thickeners" 2 operators both B's	maintain levels in filters, regulate (start and stop) filters, maintain appropriate densities in drums and thickeners by feed adjustment, regulate acid flow into thickeners
F Area "Ion Exchange IX" 1 A operator Clarifiers 2 B operators	IX operator runs chemical tests on feed, filtrate and eluate continually adjusting intake and chemicals to get desired balance Clarifiers have to be continually washed to avoid build up, some must be changed, feed levels must be maintained.
G Area "Precipitation"	IX operator checks the ph in precipitate, continually watches process making adjustments if called for
H Area "Filtration, Drying and Packing" 2 B operators	2 men watch filters and dryers making sure they are operating properly/change bags, regulate feed, maintain densities/when prec. builds up in chute they pack it into 40 gallon drums

Appendix 8

Selected Copies of Correspondence

July 4, 1977

Mr. T.H.White,
Chairman,
The University of Alberta,
Department of Sociology,
EDMONTON, Alberta
T6G 2H4

Dear Mr. White,

I have your letter dated June 28, 1977 which requests permission for Mr. Douglas Kazulak to carry out a survey which will be used to prepare his thesis.

Doug is very well known to us and has worked at the property during vacations, and we are prepared to help him in any way we can. However, before we can agree to the type of interview that would be done we would like to have a better understanding of his research design and the questions that are proposed.

Kindly forward a copy of the information to Mr. ____, General Manager who will arrange the details.

Yours very truly,

Vice-President
Technical Operations

20 July 1977

Mr. Douglas G. Kazulak
Department of Sociology
The University of Alberta
Edmonton, Alberta
T6G 2H4

Dear Mr. Kazulak:

I am replying to your letter of July 11 to Mr. _____. Because he is involved in time-consuming assignments related to his transfer to our Toronto Office, I have been asked to speak to you further.

Please call me on any week day and I think we can work things out for you. If I am not available when you call, ask for _________.

Yours truly,

Director, Personnel
and Industrial Relations

Dear _____,

As you are no doubt aware, I was in ______ during the latter part of September and the beginning of October. At that time, I took the liberty of mailing a questionnaire to you. Unfortunately, I have not, as yet, received your reply. No doubt it is in the mail.

I must apologize for not explaining my position more fully to you. I believe that the University should exist to serve the needs of people, but unfortunately without people's input, this becomes impossible.

I am still learning my trade and perhaps have asked you for too much or offended you in some way. If this is the case, then I apologize. This study represents two years of work on my part and without your cooperation and support, it stands to be a failure.

Please feel free to contact me here at the University if you have any comments, questions, suggestions or would like additional copies of the questionnaire.

Thanking you in advance, I remain

Douglas G. Kazulak